



NIGERIA

Annual Report on The Agricultural Department for the year 1950-51

*Laid on the Table of the House of Representatives
as Sessional Paper No. 3 of 1953*

PRICE 9D NET

*Printed and Published by the Government Printer, Nigeria, 1953
To be purchased from Government Presses, Lagos, Kaduna,
Enugu and Ibadan also from the C.M.S. Bookshops,
Lagos and Port Harcourt, the S.I.M. Bookshop,
Jos, and the Crown Agents for the Colonies,
4 Millbank, London, S.W.1*

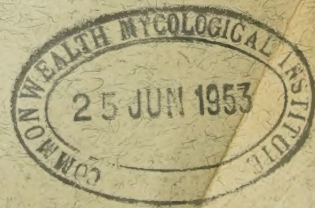


TABLE OF CONTENTS

Pages

FOREWORD	7
------------------	---

REPORT OF THE AGRICULTURAL DEPARTMENT, NORTHERN PROVINCES

Paragraphs

1. Staff and General	9
2. The Season	9
3. Shika Stock Farms	10-2
4. Daudawa Beef Herd	12
5. Cattle at Maiduguri and Yola	12
6. Cattle in Trypanosomiasis Areas	12-3
7. Mixed Farming	14
8. Cattle Auction Sales	14
9. Dairying	15
10. Pigs	15
11. Poultry	15
12. Agricultural Shows	16
13. Fodders and Pastures	16
14. Compost	17
15. Fertilisers	17
16. Experimental Farms	18
17. Agricultural Training Centres	18
18. Soil Conservation	19
19. Irrigation	19
20. Mines Land Reclamation	20
21. Mechanisation	20-1
22. Mechanisation of Rice Cultivation	22
23. Land Settlement and Planned Farming	23
24. Groundnuts	24
25. Benniseed	24
26. Virginia Tobacco	25
27. Ginger	25
28. Sunflower	26
29. Soya Beans	26
30. Rice	26
31. Sugar	27
32. Fibres	27
33. Fruit	27
34. Vegetables	28
35. Agricultural Surveys	28
36. Kashin Yawo (<i>Acanthospermum Hispidum</i>)	28
37. Allen Cotton	29

TABLE OF CONTENTS—*continued*

RESEARCH IN NORTHERN PROVINCES

A. INTRODUCTION

Paragraphs	Pages
1-4.	

B. BOTANY SECTION

5-23. Cotton	32-4
24-25. Guinea-corn	35
26. Millet	35
27. Proso	35
28. Maize	36
29. Rice	36
30-34. Groundnuts	36-7
35. Soya Beans	38
36-37. Benniseed	38
38. Sunflower	38
39. Cassava	38
40-41. Weed Control	35
42. Miscellaneous Crops	39

C. CHEMISTRY SECTION :

43-47. Field Experiments	39-41
48. Fertiliser Course	42
49. Miscellaneous	43

D. ENTOMOLOGY SECTION :

50-54. Locusts	43
55-58. Cotton	44

<i>Appendix I</i> —Rainfall Figures : Northern Provinces	45-6
--	------

REPORT OF THE AGRICULTURAL DEPARTMENT, WESTERN PROVINCES AND COLONY

1. Introduction	47
2. The 1950 Season	47
3. Government Farms and N.A. Farm Centres	47-8
4. Animal Husbandry :	
A. Cattle	49-50
B. Dairies	51-2
C. Pigs	53
D. Poultry	53-4
5. Fodder and Pastures	55-6
6. Compost	57
7. Experimental Unit Farms	57
8. Farm Schools	58
9. Oil Palms	59
10. Cocoa	60
11. Fruit	60
12. Mechanisation	60-1

TABLE OF CONTENTS—*continued*

<i>Paragraphs</i>	<i>Pages</i>
13. Fertilisers	62
14. Nigerian Birdseye Chillies	62
15. Rice	63
16. Cotton	64
17. Tobacco	64
18. Coffee	64
19. <i>Tetracarpidium</i>	64
20. Hevea Rubber	64
21. Vegetables and Ornamental Garden Work	64
22. Development Loans	65
23. Crop and Land Surveys	65
24. Practical Training Courses in Agriculture	65
25. Agricultural Shows	65
<i>Appendix I—Rainfall Figures : Western Provinces</i>	66-8
<i>Appendix II—Agege Dairy Accounts, 1949-50</i>	69-71
<i>Appendix III—Agege Dairy Accounts, 1950-51</i>	72-4
RESEARCH IN THE WESTERN PROVINCES	
A. INTRODUCTION :	
1-4.	
B. BOTANY SECTION :	
5-9. Cocoa	75-6
10-11. Kola	77
12-15. Citrus	77
16. Cotton	78
17-18. Maize	78
19-20. Miscellaneous Crops	78
21. Plant Introductions	79
22-29. Black Pod Disease of Cocoa	79
C. CHEMISTRY SECTION :	
30-31. Soil Surveys	80
32-33. Field Experiments	80
34-36. Laboratory Work	81
37-39. Studies of Soil Fertility	82
40. Soil Types and Soil Map of Nigeria	83
D. ENTOMOLOGY SECTION :	
41-44. Cocoa Pests and Diseases	83
45-49. Chrysops Research	84
50. Cotton Pests	85
51-53. Tsetse Fly Investigations	85
54-59. Minor Pests	85
60. Insect Collections	86

TABLE OF CONTENTS—*continued*

REPORT OF THE AGRICULTURAL DEPARTMENT, EASTERN PROVINCES

A. STAFF AND GENERAL :

<i>Paragraphs</i>	<i>Pages</i>
1-4. Staff	86
5-6. Eastern Regional Production Development Board	87
7. Agricultural Education	87
8. New Stations and Prospects	88
9. Rivers Province	88
10. Rice Research Station	88
11-14. Provincial Farms	88

B. THE 1950 SEASON :

15-18.	89
--------	----

C. ANIMAL HUSBANDRY :

19-20. Cattle	89
21. Sheep	90
22-23. Pigs	90
24-25. Poultry	90
26-27. Fodder Crops and Pastures	91

D. SOIL FERTILITY :

28. Soil Fertility	91
29-32. Artificial Manure Demonstrations	91-2
33. Rice	93
34-36. Experiments with Artificial Manures	93
37-38. Compost	94
39. Oil Palm Industry	94
40. Oil Palm Cultivation	94
41. Oil Palm Machinery	95
42. Oil Palm Research Station	95

E. OTHER CROPS :

43. Linseed	95
44. Potatoes	95
45. Coffee	96
46. Fibres	96
47. Tea	96
48. Kola	96
49. Nurseries	96
50. Loofah	96
51. Hevea Rubber	96
52. Coconuts	96
53-54. Rice	96
55. Rice Mills	97
56-57. Cocoa	97

TABLE OF CONTENTS—*continued*

F. MISCELLANEOUS ACTIVITIES :

<i>Paragraphs</i>	<i>Pages</i>
58-61. Agricultural Engineering Branch	98
62. Market Gardening	98
63. Soil Conservation	99
64. Bamenda-Cross River-Calabar Scheme	99
65. Botanical and Pathological Work	99
66. Entomological Work	99
67. Chemical Work	99
<i>Appendix I—Eastern Provinces</i>	100

RESEARCH IN THE EASTERN PROVINCES

A. INTRODUCTION :

1-2.

B. BOTANY SECTION :

3. General	101
4. Cassava	101
5. Citrus	101
6. Other Crops	101

C. CHEMISTRY SECTION :

7. Soil Surveys	101
8-10. Field Experiments	101
11-12. Laboratory Work	102

D. ENTOMOLOGY SECTION :

13-17. Yam Beetles	102
----------------------------	-----

REPORT OF THE COCOA DIVISION

A. NIGERIAN COCOA SURVEY :

1. Resurvey of Farms	103
2. New Plantings	103
3. Observation Plots	103

B. SWOLLEN SHOOT DISEASE :

4-7. Sealing-off Policy	104
8. Conclusions	105

C. REHABILITATION AND DEVELOPMENT :

9-11. Swollen Shoot Areas	106
12. Maintenance of Economy of Diseased Areas	106
13. Nursery Work	106
14-16. Future Problems	106

D. IMPROVEMENT OF QUALITY OF COCOA :

17-18. Quality	107
------------------------	-----

E. COCOA SOIL SURVEY :

19-20. Soil Survey	107
----------------------------	-----

TABLE OF CONTENTS—continued

F. COCOA AGRONOMY :

Paragraphs

Page

21. Cocoa Propagation	10
22. Botanical Work	10
23. Black Pod Disease	10

REPORT OF THE SCHOOLS OF AGRICULTURE

A. IBADAN :

1-5. Courses	10
6. Buildings and Equipment	11
7. The School Farm	11
8. Investigations	11

B. SAMARU :

9-14. Courses	11
15-19. The School Farms	11

REPORT OF THE OIL PALM RESEARCH STATION

A. ADMINISTRATION AND DEVELOPMENT :

1. Development	11
2. Finance	11
3-6. Staff	11
7-10. Construction Programme	11
11-12. Planting	11
13. Palm Fruit Yield at O.P.R.S.	11
14-15. Sub-station—Abak	11

B. RESEARCH :

Agronomy Division

16-17. General	11
18-20. Establishment of Palms	11
21. Experimental Work at O.P.R.S.	11
22. Farmers' Plots	11
23-25. Germination of the Oil Palm	11

Plant Breeding Division

26. Breeding Programme	11
27. Introductions and Seed Exchanges	11
28. Planting	11
29. Palmetum	11
30-31. Improved Seed for Farmers	11

Plant Pathology Division

32-33. General	11
------------------------	----

GENERAL APPENDICES

<i>Appendix I</i> —Summary of Expenditure and Revenue : April 1950 to March 1951	118
<i>Appendix II</i> —Financial Statement : April 1950 to March 1951	118
<i>Appendix III</i> —Senior Service Staff, Agricultural Department as at 31st March, 1951	121

FOREWORD

The report which follows marks the end of an epoch in Nigerian Agricultural history, for the year 1951 coincides with the end of a remarkable fifty-year period during which orderly Agricultural Development began in a modest way, and ended with the establishment of comprehensive Regional organisations equipped for taking greater advantage than ever before of available conclusions from Agricultural research and experience. Production Development Boards have made funds available for agricultural development in such a way as to make increasingly fuller use of trained staff.

The year marks the introduction of important legislation to establish the Oil Palm Research Station as an Institute on a West African basis, with responsibilities for research in the Gold Coast and Sierra Leone as well as in Nigeria.

In a report full of records of endeavour, it is difficult to select for particular attention all the fields of achievement deserving of special mention. However I cannot let this opportunity pass without reference to the progress made in experimental work with commercial fertilisers, and in arrangements for their distribution. Progress thus far has been most marked in the Northern and Eastern Regions.

Highly satisfactory progress has been made with development of the N'dama breed of cattle ; and this success has led to decision to make further purchases of stock in French Guinea.

The year has seen a commendable start in the organisation of a Soil Survey in the cocoa growing areas of Nigeria. As the Survey develops it is intended to expand its activities outside the cocoa areas, and eventually to embrace all the important agricultural areas in the country.

Staff employed by the Empire Cotton Growing Corporation have continued to make a most valuable contribution to the Cotton growing industry of the Northern Provinces. Increased production for export is in very large measure attributable to the maintenance of a continuous flow of high grade seed.

There have been remarkable increases of acreage sown to rice in the Western and Eastern Regions in particular, and in this the efforts of departmental officers in the matters of propaganda and seed distribution have been amply justified and rewarded.

It has not been possible to proceed as rapidly as had been hoped, with the development of irrigation. Nevertheless the limited staff available for planning and construction have succeeded in the partial completion of important projects in the Niger and Sokoto Provinces, and in producing approved plans for future work in the Lake Chad area of Bornu Province.

Mechanisation is taking an increasingly important place in Nigerian Agriculture, and the staff of the section of the Department devoted to this work have carried out extensive trials at suitably selected stations.

It is of some historical interest to note that the first Agricultural Show in Nigeria was held in Lagos in 1903, and that the first inland Agricultural Show was held at Ibadan in 1910. At the latter which was a two-day affair, it was estimated that some 30,000 people attended. The show was opened by His Excellency the Governor, Sir Walter Egerton, and the prizes consisted of five Gold Medals, ten Silver Medals and £225 in cash. Since these early shows took place, the popularity of Agricultural Shows has gradually increased, until today each Region boasts its quota of successful shows at which products of farm and forest can be displayed in competition.

To conclude these brief introductory notes, I wish to make mention of the important work of the Department's Agricultural Schools, and the satisfaction of all concerned at the establishment and progress of the Agricultural Faculty at Ibadan University College.

It is with a sense of pride in the achievements of the staff of my Department, that I introduce this report. Constituting as it does, something of a landmark in a series of contributions toward better Agriculture, I have every confidence that those who follow to take up the challenge of Nigerian hopes and aspirations may find in these pages a measure of useful material on which to build.

A. G. BEATTIE,
Director of Agriculture

Report of the Agricultural Department, Northern Provinces for the year 1950-51

STAFF AND GENERAL

The staff position still remains critical in spite of slightly improved recruitment during the year. Wastage in the Agricultural Officer grade is still high, only two new Officers of this grade having been appointed against four losses. Their places are being taken by Agricultural Superintendents of whom seven were appointed. In the Engineering Section a Principal Engineer, an Agricultural Engineer and two Mechanic Demonstrators were appointed. For the Irrigation Section, two Pupil Engineers were seconded from the Public Works Department and one temporary Engineer was engaged locally. In all, against nine Senior Service losses there can be placed sixteen gains. The result has been that the Irrigation and Engineering Sections of the Department are beginning to expand to an effective size. It has to be recorded, however, that qualified staff is still far short of requirements and it has not yet been found possible to post an Agricultural Officer to Kabba Province, while Zaria and Benue Provinces had only one Senior Service Officer each. With the demands for staff for special schemes and settlements, there are little signs of any improvement in provincial staffing at present. One welcome relief must be noted and that is in the numbers of trained Junior Staff coming out of Samaru School.

Six Cotton Cultivation Officers were recruited on the financial responsibility of the Cotton Marketing Board to assist with propaganda on the proper cultivation and marketing of the crop. The Empire Cotton Growing Corporation still have a Cotton Breeder and Entomologist at work.

Mr J. W. Wallace, Deputy Director of Agriculture, Northern Region left the country on retirement in January 1951. It is with regret that the death of Mr G. Browne, O.B.E., Agricultural Engineer, is recorded. He had been associated with the department since 1925, serving first with the Empire Cotton Growing Corporation for sixteen years, and was taken ill while on duty.

Mr Rhind, O.B.E., was sent out by the Colonial Office to investigate the possibilities of centralising research in West Africa and arrived at the end of the year. Mr Williamson, Assistant Secretary in charge of one of the Production and Marketing Departments of the Colonial Office, also visited the Northern Provinces.

THE SEASON

2. The rains in the area north of latitude 12° were very scanty until the beginning of July. After their early ending the previous year this extended the normal dry period from seven months to almost ten without an effective growing rain. In the same area the rainfall was excessive in August. Extensive flooding and damage to crops resulted. In the Middle Belt conditions were reversed. Early rains were satisfactory, only to be followed by a drought in July and August.

Fortunately the rains continued late in all areas and saved the crops from failure. Nonetheless corn crops in Daura and Kazaure emirates were poor enough to endanger the livelihood of the people. In Bornu on the other hand the heavy rains gave fair wet season crops and excellent conditions for the dry season guinea-corn crop (*masakwa*). Rice suffered from flooding in Sokoto and from drought in Bida.

In spite of this year of extremes, prices do not seem to have risen greatly. The following are given for comparison :—

AVERAGE YEARLY PRICE OF GUINEA-CORN PER TON

Year	Zaria City	Zaria Districts	Gusau	Kano City
	£ s d	£ s d	£ s d	£ s d
1948	12 17 0	8 17 0	10 0 0	14 0 0
1949	21 0 0	15 11 0	17 0 0	18 0 0
1950	21 16 8	18 6 3	18 12 6	22 5 10

There were some very high prices for guinea-corn recorded during the period, up to £30 per ton being paid during the wet season in Maiduguri and Daura, but these were not maintained.

SHIKA STOCK FARM

3. Breeding work at Shika is still being hindered by trypanosomiasis. In spite of concentrated efforts to eradicate "tsetse", curative treatment with antrycide and the use of gammexane dip to suppress biting flies, a number of cases still occurred. A survey showed that no "tsetse" flies were to be found within the boundaries of the reservation.

Crop yields were better than last year. Guinea-corn yielded an average of 1,170 lbs per acre against 1,017 the previous year. Sunflower silage was substituted for the sweet potato root-crop owing to the progressive falling off in yield from the latter. The average yield of sunflower for silage was 8.9 tons green matter per acre and the change over is considered a success. The reason for the degeneration of the sweet potato crop has not yet been fully explained. A trial with newly introduced planting material showed that this gave a reasonable yield which was over fourteen times as much as that produced from the old clones.

A new milking-shed has been built and a milking machine is being installed.

The percentage of abortions has fallen from 13.6 per cent to 9 per cent this year. No positive reactors to the Contagious Abortion test were found among the cows that aborted. Supplies of S.19 were only obtained late in the year.

During the year forty-four beasts were distributed to other stations and the University College, Ibadan. There were 130 births, which with other gains and losses left a total of 635 beasts at the end of the year ; classified as follows :—

SUMMARY OF STOCK AT 31ST MARCH, 1951

Class of Animal	Entire Males	Females	Total Breeding Stock	Castrated Male
Pure bred White Fulani	162	276	438	1
Pure bred Sokoto	42	108	150	—
Pure bred Jot Koran	3	5	8	—
Cross breeds	12	26	38	—
Totals	219	415	634	1

The lactation figures for the two herds are given in summarised form below. That for the White Fulani herd shows a very satisfactory increase of over 500 lbs. The figure for lbs milk per day between calves again shows an improvement for both herds. Greater efficiency in controlled mating is partly responsible.

							<i>Lbs Per Day between Calves</i>		
							1948	1949	1950
White Fulani	..	..	..	..	..	..	5.89	5.92	7.16
Sokoto	..	..	..	..	..	..	5.80	5.84	6.51

WHITE FULANI HERD (1949 FIGURES IN BRACKETS)

<i>Lactation No.</i>	<i>No. of Cows</i>	<i>Average Yield in Lbs</i>	<i>Average Days in Milk</i>	<i>Best Lactation in Lbs</i>
1st	10 (17)	2,134 (2,935)	257 (315)	4,229 (4,444)
2nd	10 (18)	2,963 (1,961)	288 (246)	4,930 (4,118)
3rd and subsequent ..	30 (39)	3,314 (2,565)	299 (273)	4,942 (4,069)
Herd Average	50 (74)	3,008 (2,505)	288 (275)	

The incidence of trypanosomiasis was heavy in the Sokoto herd and, depressed yields in the younger classes.

SOKOTO HERD

<i>Lactation No.</i>	<i>No. of Cows</i>	<i>Average Yield in Lbs</i>	<i>Average Days in Milk</i>	<i>Best Lactation in Lbs</i>
1st	10 (7)	2,676 (2,651)	293	4,258
2nd	4 (6)	2,687 (2,643)	267	3,637
3rd and subsequent ..	11 (14)	2,911 (3,022)	279	4,276
Herd Average	25 (27)	2,781 (2,842)	283 (294)	

JOT KORAN

No Completed Lactations

In the White Fulani Herd there were twenty lactations of over 3,500 lbs, and eight in the Sokoto Herd. Among the White Fulani the offspring of Bull No. 34 (strain 2) are again outstanding. The slaughter of this bull as a doubtful reactor to the agglutination test was a severe loss, but it is fortunate that he had been extensively used on the herd beforehand.

The Sokoto herd did not show any marked differences from 1949-50. Had the outstanding daughters of Stock Bull No. 17 come into the analysis the average would have been considerably higher. That five out of the eight high lactations were first lactations gives hope for future improvement.

An attempt to add to the numbers of high yielding White Fulani cows and introduce fresh genes to the herd proved abortive. No cows of even reasonable performance could be obtained from the Fulani owners although every assistance was given by the Veterinary Department on the Plateau.

DAUDAWA BEEF HERD

4. The herd increased from 177 to 238 during the year and the stage is now approaching when more rigorous culling and selection for type will be possible. Interesting figures for live weight increases have been recorded.

	<i>Yearlings and two- year olds</i>	<i>Calves age at 31st March, 1951</i>			
		<i>0-3 months</i>	<i>3-6 months</i>	<i>6-9 months</i>	<i>9-12 months</i>
Number of Animals	86	13	17	21	12
Best live weight increase per day in lbs	1.37	1.3	1.02	1.17	1.15
Average live weight increase per day in lbs	0.77	0.95	0.67	0.73	0.85
No. over 1 lb live weight increase per day	8	6	1	2	3
No. between 0.7 to 1	49	6	4	10	7
No. below 0.7	29	1	12	9	2

Lactations of the dams are taken by test milkings weekly. They vary from 2.9 lbs per day to 10.6 and the number of days in milk from thirty-five to 291. No very close correlation is evident between the dams yield and the live weight increase of the calf, which appears able to make up for poor growth in the early stages by greater weight increases when it goes on to solid food.

CATTLE AT MAIDUGURI AND YOLA

5. The herd of Shuwa cattle at Maiduguri has increased from 136 to 160. A number of heifers bred on the farm have now entered the milking herd, and this has tended to reduce the herd average which before was mainly calculated from mature cows. The herd average was 2,589.6 lbs compared with 2,900 lbs in 1949 and the figure for lbs of milk produced between calves was 6.53.

The herd of humpless Kuri cattle, the native cattle of the Lake Chad swamps, has been maintained at Wulgo under native conditions, as there is not enough staff to allow of proper management and recording. Pleuro-pneumonia and an undiagnosed disease characterized by swelling of the feet followed by death in ten to twelve days have reduced numbers from thirty to twenty.

At Yola, work on building up the herd of Adamawa Fulani cattle was retarded by outbreaks of pleuro-pneumonia making further buying-in impossible. The herd, however, increased from eighty to 100 by natural means. The figure for production per day between calving for this herd was 5.26 lbs, over twenty-six completed lactations.

CATTLE IN TRYPANOSOMIASIS AREAS

6. The experiment laid down to test the resistance of the N'dama breed compared to N'dama x White Fulani F.1 crosses and pure White Fulani was concluded in October

1950. The work was carried out by the West African Institute of Trypanosomiasis Research with cattle supplied by the Agricultural Department. The conditions of the experiment were laid down by the institute and Agricultural and Veterinary Departments in consultation.

The cattle under test consisted of twelve White Fulani, twelve N'dama x White Fulani F.1 cross-breds and eight pure N'damas. They were acclimatised at Samaru Farm for three months and given curative Antrycide treatment to clear up any latent infection. They were then taken to Katabu near Kaduna and grazed once weekly along a stream infested with riverine tsetse, which was considered likely to give about the normal trypanosome challenge for this area. Blood slides were examined weekly for infection.

At the end of 320 days all twelve White Fulani cattle had become infected and nine had died. All the cross-breds had become infected although infection was not so quick as with the White Fulani, and four had died. Among the N'dama, four only had shown a transient slight infection and four remained apparently uninfected throughout. None died and all remained in good condition at the end of the test.

Subsequently, six N'dama x White Fulani crosses and five N'damas were transferred to Lumu where the risks of infection were considerably greater and they were exposed daily to *Glossina morsitans*. Previous experience had shown that White Fulani could not survive more than three months in this area, so no more were sacrificed in this test. After 140 days here five of the cross-breds had died, while none of the N'damas had even shown infection.

In summing up this experiment, the West African Institute of Trypanosomiasis Research say—

“The evidence available suggests that the resistance of N'dama cattle to trypanosomiasis is natural rather than acquired. If it were acquired it would be expected that it would be specific, whereas the indications are that it is non-specific. Furthermore, the fact that N'dama x White Fulani crosses are more resistant than pure Fulanis supports this view”.

(ii) Ilorin Stock Farm has continued work on Trypanosomiasis resistant breeds of cattle pending a decision by the West African Institute of Trypanosomiasis Research as to whether they will be able to undertake further investigations. The N'dama herd showed its superiority again, although the general incidence of infection was higher throughout. The comparison will be evident from the following table :—

Breed	Percentage Infection by Trypanosomes		Percentage Treated		Percentage Losses through "Tryps"	
	1949	1950	1949	1950	1949	1950
N'dama	41.3	44.9	2.17	2.6	3.3	3.8
Gold Coast	41.2	50.0	5.9	25.0	4.4	22.5
N'dama x Borgawa Crosses	33.3	50.0	12.3	11.9	10.5	9.5
Borgawa	36.4	87.5	45.5	75.0	26.4	25.0

The period elapsing between calving was rather longer, 415 days against 400 last year, though still an improvement on the average of 443 days for 1944-49 in the N'dama herd.

The Gold Coast herd also deteriorated in this respect. Milk records calculated on weekly test recordings are up on last year. The N'dama herd averaged 889 lbs for twelve completed lactations of 293 days, the highest yielder giving 1,477 lbs. The Gold Coast herd were a little better, while the Borgawa and Kaiama cattle averaged 1,245 lbs in 298 days with two yields of over 1,900 lbs.

A new introduction of Borgawa cattle was obtained from Kaiama as it was thought that existing stock were not true to type. Twelve cows and heifers were bought. This herd has proved disappointing so far. All except one were positive to "tryps" on arrival. Three have since died and out of five completed pregnancies only one live birth has occurred.

(iii) In Kabba and Benue Provinces the policy of grading up the local dwarf (Muturu) cattle to N'dama continues. N'dama x Muturu cross breds show improved live weight increases over pure Muturus after six months.

(iv) Cross breeding of White Fulani to N'dama was continued at Samaru. The F.1 cross makes a hardy and useful working beast.

MIXED FARMING

7. The rate of expansion in the numbers of Mixed Farmers continues to accelerate in spite of the poor farming conditions experienced : 1,577 new farmers were established compared to 1,342 the previous year and the net increase was 1,289 against 1,043. There have been difficulties. In Daura many farmers had to sell off the cattle in order to purchase corn on account of the bad year. Cattle-thieving is reported from Bornu as a factor limiting expansion. Shuwa cattle-owners are said to be breeding to Rahaji bulls in order to increase the fierceness and intractability of their stock as a preventive measure. Quality of cattle on offer has been poor and prices high after the bad season. Losses of cattle from disease were rather higher for the same reason.

Ploughs were in adequate supply throughout the year and as an insurance against possible future shortage due to re-armament, the Northern Production Development Board made a grant of £10,000 to purchase 1,400 ploughs as a reserve. The numbers of Mixed Farmers are given by Provinces below :—

<i>Province</i>	<i>No. at end 1950</i>	<i>Net increase in 1950</i>
Katsina	2,649	410
Kano	1,784	326
Bauchi	1,221	351
Sokoto	629	71
Zaria	451	42
Adamawa	152	71
Plateau	60	3
Bornu	68	12
Niger	38	3
	<u>7,052</u>	<u>1,289</u>

CATTLE AUCTION SALES

8. The Kano auctions for mixed farmers' and fatteners' cattle were reorganised on a cash basis and buyers restricted to members of the Kano Cattle Buyers Association. 601 cattle passed through the sales valued at £10,091. The records of this market show clearly the rise in prices of all classes of stock over the last five years.

Grade	Number of cattle and average price in pence per lb live weight				
	1946	1947	1948	1949	1950
Very fat	6 (3.30)	18 (4.28)	49 (4.83)	8 (6.00)	21 (6.77)
Fat	133 (3.04)	205 (3.77)	89 (4.39)	144 (5.09)	220 (5.62)
Forward Stores	164 (2.86)	267 (3.45)	516 (3.55)	304 (4.08)	311 (4.10)
Stores	42 (2.17)	46 (3.21)	—	130 (3.77)	45 (4.10)
Others	—	—	—	14 (—)	4 (3.50)

A new cattle market was opened in Funtua in March complete with watering, weighing and railing facilities. Only one market has been held so far at which seventy-five stores changed hands at an average of £13 10s 0d each.

DAIRYING

9. The exceptionally long dry season hit the Kano Dairy farmers hard. Fodder was short, and milk yields fell off. The number of farmers keeping cows fell from seventy-two to sixty-eight and the average number of cows in milk from twenty-six to twenty-three. They produced 13,217 bottles of milk and with 557 from the Native Administration Pool, 8,309 from the Government herd and 3,653 bottles supplied by Fulani, the total for distribution was 25,736 bottles of fresh milk.

It is hoped that shortly the dairy will be complete. Electric power is still awaited. Using the old equipment 3,523 lbs butter, 2,025 lbs cream, 178 lbs cheese and 5,785 gallons of skim milk were produced for local consumption. The sale value of this was £1,202. At Okene and Kabba supplies of milk amounting to 4,713 gallons were produced from Nigerian Shorthorn cattle.

PIGS

10. The year was characterised by a falling off in demand by the Cold Storage Company, who declined to accept any pigs for a period of three months. Alternative markets had to be found at short notice, which resulted in price reduction and losses. On account of this, permission was sought to close down Daudawa and Samaru piggeries altogether. Shika has been retained as a breeding centre with a limited commercial production and the Minna piggery was finally handed over to the Department of Commerce and Industries in February. Thus the Agricultural Department will in future be concerned principally with maintenance of improved stock, while the Commerce and Industries Department and private breeders will meet commercial demands.

In all 3,035 pigs were railed to Lagos from Departmental piggeries during the year. Private breeders railed 3,046, the bulk of which came from Mr Maroun's piggery in Kano (2,500).

Weaners bred in the Dass district of Bauchi Province and the Anchau District of Zaria Province are still fattened in departmental piggeries.

A considerable trade based on pigs of English blood exists in the districts round Kafanchan, whence large numbers are now railed to the Eastern Provinces. The original stock was supplied from the departmental piggery at Zonkwa, where breeding stock for distribution is being maintained.

POULTRY

11. Riyom is the main breeding centre of Rhode Island Red poultry. The old stock has now been completely cleared out and replaced by stock from Oyo. Improvements in management and housing have also been effected and the numbers of eggs and

young chickens available are increasing rapidly. Distribution remains a difficulty as the railway has had to be ruled out owing to the danger of disease from ticks and lice from native fowl previously carried in the wagons.

Disease is always with us as far as poultry are concerned. Fowl-pox wiped out the flock at Maiduguri. Bacillary White Diarrhoea is reported from the Sokoto Farm poultry. Yandev and Ilorin also had trouble with fowl-pox and other diseases. In spite of this a steady output of fowls for crossing with the local stock is being maintained.

Results of village distribution of cocks in Ilorin were disappointing. Only seven out of twenty-five cocks were alive after a year in one village where they were given out.

AGRICULTURAL SHOWS

12. Agricultural shows were held in most of the Provinces. Some had to be abandoned on account of the prevalence of pleuro-pneumonia among cattle. Stock classes are more popular than produce, which cannot be either spectacular or easy to judge. A feature of some of the shows were exhibits of processing machinery by the firms.

FODDERS AND PASTURES

13. Research on pastures still awaits the appointment of a specialist. The problem of maintaining grass cover and providing wet season grazing as well as silage and hay is a pressing one. Many of the difficulties are practical ones; adequate fencing, land tenure systems and comparison with economic crops among them. It will be a long time before they can be overcome in heavily populated areas. Where information is most wanted is in advising on opening up settlement schemes.

Some progress has been made by individual stations and the following items are of interest. Three acres of unimproved grassland were found to provide sufficient keep for one adult beast at Riyom on the Plateau. At Yola the only conclusion that could be drawn was that five acres were insufficient. Similar work is going on at Ilorin, Maiduguri and Shika but the number of accidents which can occur in this type of work are many and no reliable results are yet forthcoming. *Cenchrus Prieurii* and *Cenchrus ciliaris* have been found valuable introductions as fodder grasses in Maiduguri and Yola, giving a good early bite in the rains. A number of stations are establishing observation plots of introduced and indigenous grasses. Ilorin station has conducted a number of experiments on pasture managements. Frequent burning has been found to kill out the more useful grasses such as "Gamba" (*Andropogon Gayanus*) and Kyasuwa (*Pennisetum spp.*) and encourage poorer grasses. Dressings of 100 lbs sulphate of ammonia and 200 lbs of superphosphate have given increases of 27 per cent and 34 per cent alone and 65 per cent when combined on an established gamba pasture, but results were insignificant when the same dressings were applied to natural pasture. A test to assess the palatability of twelve varieties of imported and native grasses showed that gamba (*Andropogon Gayanus*) gave palatable grazing and recovered well in the rains. In the dry season, star-grass (*Cynodon plectostachyon*) remained green and was eaten. Legumes were found to have a poor survival in grass mixtures and were hardly touched by stock.

The irrigated lucerne plot at Maiduguri was drowned by floods in September and had to be re-established.

Silage is becoming more and more important in fodder conservation. The bulk of succulent feed which it produces is particularly valuable in the dry conditions of the Northern Provinces, and making it seems to be simpler in this country than in Great Britain. Failures are rare. A number of swamp grasses were conserved at Sokoto

with good results. Sunflower was used for ensilage at Shika with conspicuous success. Sweet Sorghum also makes a good silage. Costings were between 20s to 30s per ton of silage made.

Problems concerned with grass fallows, their establishment and treatment, are being actively investigated at nearly all stations. This is a long-term policy which will take several years to produce results. Elephant grass *Pennisetum purpescum* has shown itself a valuable soil regenerator at Maigana, but it is difficult to establish.

Results from Yandev tend to show that a three-year "gamba" fallow has maintained fertility at a reasonable standard in the second cycle of a six-year rotation. These figures are difficult to compare as weather conditions vary over each cycle and only over a lengthy period will the trends show up clearly.

COMPOST

14. An experiment laid down at Yandev shows that by composting the manure from cattle during the rains, about one-third of a ton per head more can be made, and that this extra manure gives a valuable increase in the grain crop of 150 lbs on 1,154 lbs produced by an equal number of cattle making pen manure under foot in the ordinary way.

Efforts are being made to persuade the Tiv tribe in Benue Province to adopt composting as farm practice. Demonstration plots have been laid down, and in the village of Mbaakon a herd of twenty-five dwarf cattle is being kept, their dung composted, and donkeys provided for transport to the farms. There has unfortunately been little response as yet.

FERTILISERS

15. Experiments carried out in the Northern Provinces since 1938 have shown that considerable increases of all crops can be obtained, particularly in the groundnut areas, from comparatively small dressings of superphosphate, of about $\frac{1}{2}$ cwt. per acre. More recent work tends to show that there is a deficiency of sulphur as well as phosphorus and that greater yields are to be secured by supplying both elements together as in superphosphate than when applied separately as triple phosphate and gypsum.

A campaign was instituted in 1950 utilising a grant of £350,000 from the Northern Regional Production Development Board. Previous training in methods of application had been given to teams of Administrative Officers and extension workers from the Provinces who then carried out the distribution, gave demonstrations of application and supervised distribution. The following table gives the numbers of farmers who received free supplies in 1950 amounting to 1,000 tons of granular superphosphates :—

Province	No. of Farmers supplied in 1950	No. reported wishing to buy in 1951
Sokoto	3,200	17,000
Zaria	800	2,800
Kano	12,800	1,200
Katsina	3,360	60
Bauchi	3,200	4,000
Adamawa	3,200	200
Bornu	3,200	5,000
	29,760	30,260

The results as with all work undertaken in 1950 were greatly upset by the very poor planting rains, particularly in Kano and Katsina. Resowing after application of the granules gave rise to burning of the second lot of seedlings, showing an adverse effect, which was most unlucky. General shortage of rainfall also tended to act as a limiting factor and mask the full benefits of the fertiliser. In spite of these unfortunate conditions a good start has been made and it is hoped that the increased distribution planned for 67,000 farmers in 1951 will give better results, combined with the residual effects of the 1950 campaign.

Orders were placed by the Production Development Board in 1950 for 3,203 tons of superphosphate in granular form. Of this 1,000 tons was supplied by Messrs Fisons as large granules and the remaining orders were placed in Holland and South Africa. With the world shortage of sulphur, supplies are becoming increasingly difficult to obtain.

At the prices quoted it has been found possible to sell fertiliser at 12s per 56 lb bag in the Northern Provinces. With returns estimated at from 200 to 400 lbs of groundnut kernels or grain from a dressing of this amount, the economic return may be expected to be from 35s to £6 in the first year, with a residual effect lasting up to four years.

In the Middle Belt, south of latitude 9°, superphosphate has not been shown to give any significant increases and experimental work is in progress on the use of nitrogenous manures, which appear more promising.

EXPERIMENTAL FARMS

16. Samaru Station is assuming increasing importance as the central research station for the Northern Region. A Principal Agricultural Officer is in charge of research and co-ordinates and directs the work of the seventeen experimental stations which cover the whole region. He is assisted by a Botanist who deals with introduction, selection and breeding work, an Agricultural Chemist in charge of all work on soils, fertilisers and manures, and an Agricultural Officer to run the Experimental Farm. The Empire Cotton Growing Corporation provides a Plant Breeder for cotton and an Entomologist for work on cotton pests. This team still requires considerable augmentation, but it has already accomplished much both in setting the pattern for research and in actual work done. Details will be found elsewhere in this report.

AGRICULTURAL TRAINING CENTRES

17. The Jos Native Administration Farmers' Training Centre completed its fourth course. There has been difficulty in finding farms for students when they return to their villages on completion of their training. On the first three courses, thirty-two farmers were trained in all. Their subsequent history may be indicated as, two excellent, sixteen above average, eight doing moderately well, three failed completely and two died.

The Katsina Native Administration School at Kafinsoli turned out a further forty-three boys trained as mixed farmers of whom four were taken on as Native Administration Agricultural Assistants. Reports on the ex-servicemen given a course at this centre, now discontinued, indicate that the efforts put into trying to teach them agriculture were largely wasted and that in spite of every assistance, but few of them eventually became farmers.

In Kano a site has been selected for a Native Administration Agricultural School.

In Adamawa co-operation with the Education Department has resulted in the opening up of seven school Unit Farms on Mixed Farming lines, and two other schools operated small sugar-mills.

Educative work has been effective in Ilorin. Ten boys were given a year's agricultural training on the farm. A four-day course was given to twenty Native Administration teachers. Excellent results are being obtained by the Omu-Aran Native Administration School Farm. After seventeen years of farming the yields are being well maintained and improved by manure and compost from cattle and poultry.

SOIL CONSERVATION

18. The death, after invaliding of Mr G. Browne, Agricultural Engineer, left the department without Senior Service Staff for this section and a successor to him has not yet been found. Agricultural Officers were able to carry out a certain amount of work with the aid of trained assistants on departmental farms and tractor farms, and some large scale work was undertaken in Kano Province at Jogana and Sumaila.

The terracing systems at Gyel and Vom Turu continue to function well, but there are no signs of increased enthusiasm from the local inhabitants to co-operate in this work. They will cut through terraces hunting rats without compunction. The Sokoto Native Administration rules for Control of Soil Erosion proved somewhat premature. They have led to increased planting of grass boundary strips in the sandy areas. With such wide variations of soil, rainfall and slope as may occur over a Province or even an emirate, rules cannot be framed to cover every case or take the place of education in better farming practices.

IRRIGATION

19. The staff position was improved by the secondment of two pupil-engineers from the Public Works Department and the local recruitment of another qualified engineer, bringing the staff up to five.

Training of assistant surveyors continued at Sokoto. We are indebted to the Survey Department for the loan of a trained teacher. Two courses were completed. Out of sixteen pupils, ten succeeded in passing the examination and are now employed. A third course is in progress.

It has not been found yet that surveyors so trained can be relied on to work away from supervision, so that progress must be limited for some time by the numbers of senior staff available.

Construction began on the Edozhigi Scheme near Bida in Niger Province, designed eventually to give controlled flooding for some 2,500 acres of rice with enough water available for about 1,000 acres of dry season crops as well. The control works, consisting of a masonry head sluice and a regulator, have been completed as well as the diversion of the Ejiko stream. A distributary channel is 90 per cent finished with subsidiary field channels, which should cover 600 to 800 acres in the coming wet season. The head sluice and regulator of the other stream, the Kupanko, have been excavated and the foundations laid. The diversion channel is half done.

The available labour although sufficient in numbers has not been very satisfactory either on daily or contract terms. Delivery of earth-moving machinery due in December was delayed, and failed to arrive before the end of the year.

A survey of the flats bordering the Gbako River covering an area of sixty square miles was undertaken. From this it appeared that irrigation from the Gbako itself would involve large and expensive headworks which would not be justified by the

area commanded. An alternative scheme for utilising a tributary stream, the Musa, commanding some 4,000 acres of which 2,500 acres could be irrigated in one year, was therefore, adopted at an estimated cost of £7 per acre irrigated. Work is to start in May 1951 and should be completed in time for planting in 1953.

Smaller schemes have been surveyed and will be soon put in hand at Loguma, Bakoji and Toroko covering in all some 2,750 acres.

Lake Chad Irrigation Scheme.—The ground survey for a pilot scheme on the shores of Lake Chad was carried out and plans and estimates have been drawn up. Reclamation of 1,500 acres of seasonally flooded land is contemplated which will be irrigated by the dry season rise in the lake-level providing a small head of water to be admitted through sluices to the protected area. More staff is essential, however, before this scheme can be undertaken.

Finally we are now faced with the task of training the cultivators to utilise irrigation to the best advantage in growing crops. Again no staff is available for this task, although provision has been made, and with each year that passes it will become a more difficult one to undertake.

MINES LAND RECLAMATION

20. Work has continued on the Plateau minesfield. Trials of levelling old dragline dumps have been proceeding in conjunction with the programme of manufacturing and applying compost and sown covers to the tailings areas. Some 188 acres (including forty tailings) were levelled between April and January, using D6 Caterpillar tractors and Bulldozers, at costs between £15 and £20 per acre. Compost was spread on 157 acres at rates between twenty and forty tons per acre at an average cost of £25 per acre.

A stage has now been reached when sufficient experience has been accumulated to enable a programme to be prepared for future work and more economical machinery procured to do it.

MECHANISATION

21. This year was the first in which proper farming operations could be carried out on the Tractor Unit Farms and accounted for on a basis uncomplicated by clearing operations. It is unfortunate that sufficient skilled supervision was not available to give them detailed individual attention, which is essential to obtaining reliable results. Maintenance of machinery, proper setting of implements, the timing of operations on the land are all matters requiring constant supervision by experienced and skilled operators and in the present understaffed conditions this was impossible. At the same time as investigations are proceeding on mechanised farming on the upland, staff is being drawn off to major schemes in connection with swamp cultivation of rice and works involving mechanical earth-moving equipment. Nevertheless a creditable amount of information has emerged, sufficient to give a foundation to further investigation and to allow an evaluation of the part which mechanisation is likely to play in the agriculture of the country.

A summary of the costs and yields per acre for the three main crops for five of the tractor farms is given here, compared with hand labour costs for the Samaru local practice farm. These costs include depreciation on tractors, but no overheads for supervision or interest on capital expended on buildings, clearing or soil conservation.

GUINEA-CORN

	<i>Daudawa</i>	<i>Gusau</i>	<i>K'soli</i>	<i>Bida</i>	<i>Ilorin</i>	<i>Average</i>	<i>Hand-farm</i>
Manual Labour ..	£ s d 1 8 8	£ s d 1 2 1	£ s d 1 7 10	£ s d 1 14 11	£ s d 4 9 7	£ s d 2 0 7	£ s d 7 17 0
Tractor Costs ..	1 2 7	0 17 9	1 9 9	1 0 2	2 2 8	1 6 7	—
TOTAL ..	2 11 3	1 19 10	2 17 7	2 15 1	6 12 3	3 7 2	7 17 0
Yield Grain per acre ..	723 lbs	403 lbs	873 lbs	89 lbs	222 lbs	462 lbs	987 lbs
Value ..	£ s d 6 0 7	£ s d 2 19 4	£ s d 5 15 5	£ s d 0 12 0	£ s d 1 19 8	£ s d 3 9 5	£ s d 8 4 6

GROUNDNUTS

	<i>Daudawa</i>	<i>Gusau</i>	<i>K'soli</i>	<i>Bida</i>	<i>Ilorin</i>	<i>Average</i>	<i>Hand-farm</i>
Manual Labour ..	£ s d 3 10 0	£ s d 1 15 7	£ s d 2 12 4	£ s d 5 1 7	£ s d 4 9 8	£ s d 3 9 10	£ s d 6 18 10
Tractor Costs ..	1 0 1	0 11 6	2 13 11	1 5 5	2 5 3	1 11 3	—
TOTAL ..	4 10 1	2 7 1	5 6 3	6 7 0	6 14 11	5 1 1	6 18 10
Yield Nuts per acre	272 lbs	288 lbs	537 lbs	190 lbs	255 lbs	308 lbs	523 lbs
Value ..	£ s d 2 11 0	£ s d 2 14 0	£ s d 5 0 8	£ s d 1 15 7	£ s d 2 7 10	£ s d 2 17 9	£ s d 4 18 0

COTTON

	<i>Daudawa</i>	<i>Gusau</i>	<i>K'soli</i>	<i>Bida</i>	<i>Ilorin</i>	<i>Average</i>	<i>Hand-farm</i>
Manual Labour ..	£ s d 2 5 8	£ s d 1 7 5	£ s d 1 14 8	£ s d —	£ s d —	£ s d 1 15 11	£ s d 6 10 10
Tractor Costs ..	1 10 1	0 12 11	2 0 0	—	—	1 7 8	—
TOTAL ..	3 15 9	2 0 4	3 14 8	—	—	3 3 7	6 10 10
Yield Seed-cotton per acre ..	267 lbs	141 lbs	305 lbs	—	—	237 lbs	294 lbs
Value ..	£ s d 4 9 0	£ s d 2 7 0	£ s d 5 1 8	£ s d —	£ s d —	£ s d 3 19 0	£ s d 4 18 0

To meet supervision overheads and interest on capital would require a charge of at least 30s per acre if a large tractor farm were to be run as an independent unit, so that in considering these costs this must be taken into account. Another point of some importance is that a poor crop generally costs more to grow than a good one on account of the extra costs involved in transplanting and weeding a stand which gives insufficient cover. Maintenance of fertility at a high level is, therefore, most important from every point of view, and the mere ploughing of large acreages on the upland without due attention to manuring and soil-conservation must be carefully guarded against. Measures for soil-conservation have been taken on all our farms and cattle are being brought into the farming system as the cheapest way of concentrating fertility.

Chemical fertilisers also have to be used to supplement cattle-dung until that can be made sufficient for the acreages under the plough by improving the carrying capacity of pastures and utilisation of residues.

(ii) A number of tractors have now been tried out. They are :—

The Fowler Marshall Crawler (Diesel)

The Fordson County Crawler (Diesel)

The Field Marshall wheeled-tractor on rubber tyres (Diesel)

The Fordson major wheeled-tractor on rubber tyres (Diesel)

The Fordson major wheeled-tractor on rubber tyres (Petrol)

The Ferguson wheeled-tractor on rubber tyres (Petrol).

(iii) The workshops at Samaru have now been tooled up to a stage where they are able to undertake all major and minor repairs and overhauls. A spares pool account has been opened on a grant of £20,000 from the Production Development Board to give a reasonable cover for all tractors and implements now in use, as it was found difficult to obtain spares from other sources without undue delay. This has all necessitated much organisation and hard work.

Servicing tractors in remote places presents a problem with the small engineering staff available and until it is clear where mechanisation is going to develop most usefully it is not justifiable to sink money in more than one fully equipped workshop.

(iv) Instruction was given to fourteen third-year Agricultural Assistants in training. Seventeen Driver-Mechanics were trained and fourteen are now under training.

MECHANISATION OF RICE CULTIVATION

22. On the unsatisfactory results of ploughing the Sokoto flood plains in 1950 with medium powered crawler tractors and disc ploughs, and on the outcome of a test using heavier equipment, it was decided to order twelve D7 Caterpillar Tractors and Davis heavy duty disc ploughs. These arrived in November and were put into operation at once. Their performance was excellent and by the end of March 1951 they had ploughed 8,436 acres.

The problems that remain before this scheme are now agricultural and economic. Sufficient acreage must be worked annually to justify the heavy capital expenditure and overheads involved, and to do this the willing co-operation of the farmers must be obtained. In a normal year a yield of $\frac{1}{2}$ ton of paddy to the acre should not be difficult to attain and at the present price of some £40 per ton the charge for ploughing at 35s an acre should prove attractive. The wide variation in the rainfall of Sokoto with consequent floods or droughts leaves an element of incalculable risk, but it is the general opinion of those who know the area that a total failure is rare. The 1950 crop may be taken to represent the worst conditions likely to occur and yields of 5 cwt were recorded from observation plots.

A small scheme using medium powered crawler tractors on lighter land at Shemankar in Plateau Province had a successful season. Recorded yields varied between 700 and 2,818 lbs, although the season was an abnormally difficult one. Only 100 acres were ploughed in this its first year, but the possibilities are considerable and it is hoped to plough up to 500 acres in the coming season of which 200 have already been completed. Maintenance of tractors has proved difficult in this remote place.

Experimental areas have also been ploughed at Bida, Yola, Kafinsoli and Kano with a view to further schemes of the same kind.

LAND SETTLEMENT AND PLANNED FARMING

PLATEAU PROVINCE

23. The Shendam Scheme has continued to make good progress. Seven villages have now been established holding 266 families from five different tribes. A joint development council has been established, which may prove an excellent solution of administrative problems. Crops on the village farms established in 1949 were good, but those started in 1950 still proved difficult to work. Wells, dams and roads are being constructed and reconnaissance of new land goes on. Forty cattle treated with antrycide have been introduced to the old villages. Farming controls are being gradually applied and one farmer in each village is to be set up as a demonstration unit. The Northern Region Production Development Board has approved a ten-year grant of £100,000 for expansion of this scheme. Applicants for resettlement are numerous and morale is generally high.

The Jema'a scheme presents a different picture. There has been stubborn opposition to its extension from the Birom chiefs and only four more families took up holdings for the 1951 wet season compared to sixteen the previous year.

In the Southern Division of Plateau Province an attempt is being made to settle Eggon tribesmen from the hills on lower land. There was insufficient preparation or survey before this scheme was mooted. The only area available for resettlement is confined and consists of highly erodible, and in some places, already barren slopes. Three villages have been built into which some fifty families are being moved. Farms of sixteen acres have been laid out for these settlers, but unless reconnaissance reveals a large area of good land in the vicinity there will be no object in going on with it. An Agricultural Superintendent was posted to the scheme in December to try and educate the settlers in soil-conservation and general agriculture, but it is still apparent that the area is not suitable to settled farming.

KATSINA PROVINCE

There have been no further developments in the planned area near Kafinsoli. Farmers are reluctant to clear the area under control without financial assistance.

The Daudawa and Mauka farm settlements show eighty-four settlers doing well, compared with eighty the previous year. Twenty-eight of these remain in debt, while twenty have some money saved, one of whom has over £100. The tendency is, however, for bicycles and wives to be the first item for expenditure of any profits made, before any thought is given to further investment in cattle or improvements.

NIGER PROVINCE

The land settlement scheme on mixed farming lines started near Kontagora in 1949-50 is being pushed ahead. Two more villages were established and a rotation of four years cropping with a catch crop, followed by a grass ley in the fifth year left down for a further three years, is to be followed. The farmers are being heavily capitalised with cattle and equipment.

The Niger Agricultural Project at Mokwa is being given all the advice and assistance possible by the department's depleted staff. As a mechanical pilot scheme its success may be of the greatest importance. Mechanical difficulties in clearing and ploughing are being solved. Good yields of groundnuts were obtained, but guinea-corn was a failure due to an unprecedented attack of cotton-stainer. The question that remains outstanding is whether the settler will consider the services rendered by mechanical cultivation, justify the portion of his crop which he is being asked to forego.

GROUNDNUTS

24. The crop this year was the smallest since 1942-43. Comparative figures are given for the last three years, by Provinces :—

	1948-49	1949-50	1950-51
Kano	179,056	107,840	68,428
Katsina	45,050	16,842	14,339
Sokoto	42,044	20,461	25,403
Bornu	27,892	16,719	15,895
Bauchi	14,446	14,001	4,978
Zaria	5,331	2,231	2,091
Adamawa	9,076	7,998	9,734
Other Provinces	5,177	2,026	1,658
	<u>328,072</u>	<u>188,118</u>	<u>142,526</u>

A number of factors accounted for this continued decrease :—

- (a) Yields were poor along the northern borders. Observation plots in Kano Province gave an overall average yield of 399 lbs shelled nuts per acre against an average of 542 lbs for the previous seven years. The same figures for Northern Kano Province only were 290 against 482.
- (b) Early plantings and volunteer crops were killed by subsequent drought and farmers were not always able to obtain seed to replant.
- (c) Prices over the French border were higher than within Nigeria and drew away a considerable portion of the crop.
- (d) There is reason to think that traders have stored a quantity of nuts in anticipation of a rise in prices.
- (e) Cotton has proved an attractive competitor to groundnuts over the past two seasons.

A Groundnut Multiplication Farm of forty acres has been established by Kano Native Administration at Dambarta, where the introduced variety M.D.351 is being multiplied. In addition the Production Development Board have made a grant to enable seed to be bought in from farmers growing it for subsequent redistribution.

BENNISEED

25. The Benue Province crop showed a further decline to 8,699 tons compared to 13,359 in 1949-50. Both yields and acreages were reduced on account of the unusually dry weather. Other purchases of the crop were recorded as 524 tons in Kabba Province and nine tons at Abuja in Niger Province.

Demonstration plots to show the advantages of thinning the crop at an early stage were again laid down at a number of centres and showed up well.

The Botanist is now selecting strains of benniseed for higher yield and early maturity.

VIRGINIA TOBACCO

26. The Nigerian Tobacco Company (formerly the British-America Tobacco Company) have gone ahead with the production of barn-cured leaf. They have extended their activities in Sokoto and opened up a leaf centre in Kano with such good results, that total purchases for the 1950-51 season amounted to well over twice those of the previous year, which on the final figures obtained after last year's report was submitted, amounted to 300,715 lbs. The most notable increase was in the Gusau area of Sokoto Province.

PURCHASES 1950-51

<i>Province</i>	<i>Grade I at 1s 3d per lb</i>	<i>Grade II at 11d per lb</i>	<i>Grade III at 5d per lb</i>	<i>Total lb</i>	<i>Value £</i>
Zaria Province	234,903	220,847	78,013	533,763	26,429
Sokoto Province :					
Gusau Area	96,744	81,180	12,198	190,122	10,021
Western	2,394	—	—	2,394	150
Kano Province	5,566	3,016	1,004	9,586	507
	339,607	305,043	91,215	735,865	37,107

Experimental work on the fertiliser requirements of the crop is being undertaken by the Department and selection and selling of plants for maintenance of pure seed stocks are in the hands of the Botanist.

Some twenty acres of newly cleared land were ploughed by tractor near Zaria to investigate the possibility of the Nigerian Tobacco Company providing this service for growers as a means to increasing production.

GINGER

27. The price of this commodity remained high after the sudden rise in 1950 with a large expansion in production as a result. Purchases of cured root ginger at the Kachia market rose again to 67 tons 6 cwt from 26 tons 10 cwt the previous year. The prices paid were 1s 9d for Grade I, 1s 7d for Grade II, a drop of from 2d to 7d on last year's market. Three firms only competed in the market.

The trade in rough cured ginger is also increasing rapidly. Figures given by the Director of Marketing and Exports show that 482 tons were exported in 1950-51, mainly to the United States. Railings of ginger from the Kachia area in the same period are recorded as 661 tons. The world price of ginger at present is stated to be £385 per ton, so that its value as an export crop has been tremendously enhanced from the £80 to £100 it was fetching two years ago.

Stocks of seed ginger were maintained at Zonkwa Farm Centre.

SUNFLOWER

28. The price of £15 per ton paid for this crop has discouraged its further extension, as it no longer compares well with corn or cotton as a cash crop. Some twenty-five tons was bought in Kabba Province. Cultivation, spacing and manurial requirements for sunflower have been worked out and its cultivation could be increased if the price warranted. As a silage crop it proved excellent for both yield and palatability at Shika Stock Farm.

SOYA BEANS

29. This crop has proved popular in Benue Province as shown by the following figures for purchases at £19 10s per ton :—

1946	..	..	..	..	..	..	..	10½ tons
1947	..	..	..	..	..	..	..	77 tons
1948	..	..	..	..	..	..	..	736 tons
1949	..	..	..	..	..	..	..	1,253 tons
1950	..	..	..	..	..	..	..	3,506½ tons

Small tonnages are also purchased in Niger, Plateau and Zaria Provinces. A good crop was grown at the Niger Agricultural Project, Mokwa. Some complaints of adulteration of the crop with Pigeon Peas were received. Although the crop in Benue has increased while benniseed has gone down, an analysis of the position shows that these crops are not in direct competition and the drop in the benniseed crop is due more to the poor season.

RICE

30. The year was unfortunately an unusually bad one for rice in the main producing areas in Niger and Sokoto Provinces. In the former province, a prolonged drought occurred in the middle of the rainy season and in the latter high floods followed a late beginning to the rains, drowning out a considerable proportion of the crop. It was unfortunate because this year was marked by the beginning of mechanical cultivation for rice on the Sokoto swamps and a good crop would have done much to popularise the scheme. The acreage involved was not so great, however, as to affect the future of the scheme unduly.

Distribution of rice seed of the varieties GC 79 and GEB 24 for medium water conditions has gone forward in Niger, Zaria, Bauchi, Adamawa, Benue and Ilorin Provinces. Seed multiplication is being carried out on special farms in these areas.

Deep water rices from Sokoto have been introduced to dwellers on the Niger flood plain in Niger Province. In Katsina mixed farmers have been encouraged to use bullocks with light digging ploughs for rice cultivation.

The rice mill at Badeggi was handed over to the Department of Commerce and Industries. It was unable to operate owing to the shortage of rice. A mill at Pategi in Ilorin is nearing completion for operation by the Native Administration, and another was set up at Utonkon in Benue Province for a private individual.

There is no doubt that rice cultivation is increasing generally and it is receiving every encouragement. The introduction of controlled irrigation for much of the Bida area within the next two years and the extension of mechanical ploughing in Sokoto should serve to increase the crop materially.

SUGAR

31. Conditions for the crop were far from good, a long dry season being followed by excessive rains in some of the main producing areas. A large number of cane-mills were put into operation during the year, which resulted in a seller's market for the cane-growers and a reduction of profits to the sugar makers.

The numbers of crushers operating in November 1950, with their estimated output of molasses sugar in comparison with the previous year is given here.

Province	1949 No. of crushers		Estimated Output in Tons	1950 No. of crushers		Estimated Output in Tons
	Issued	Operating		Issued	Operating	
Adamawa	7	7	43	15	9	54
Bauchi	18	3	30	19	11	120
Bornu	—	—	—	—	—	—
Kano	105	105	990	155	138	1,330
Katsina	98	91	1,550	105	102	1,750
Niger	1	—	—	—	—	—
Sokoto	103	43	134	103	103	527
Zaria	232	126	3,150	292	292	6,424
TOTAL	564	375	5,897	689	655	10,205

Introductions of canes from other countries are being grown at Maigana and of these, Co. 213 and 281, have been shown to have a higher sucrose content than the local cane. Manurial experiments are also in progress, but such work is difficult under swamp conditions. Control of termites, which are a major pest of plant canes, has been obtained with 6.5 per cent BHC Gammexane powder applied to the roots.

FIBRES

32. Multiplication of three varieties of jute (*corchorus*, *capsularis* and *olitorius*) has been continued at Yandev.

Attempts to buy retted rama (*Hibiscus cannabinus*) fibre at the price of 4½d per lb laid down were abortive, as the local market price was usually nearer 8d.

A very big local trade is done in this crop, however, both as retted fibre, rope and bark-strips, the latter being the common tie for thatching.

An experiment at Gusau showed that priming (stripping off the leaves and side-shoots) of rama gave a fibre yield of 66.5 per cent on stripped bark against 54.5 per cent for unprimed.

FRUIT

33. In accordance with policy, fruit-tree nurseries have been established at most of our stations. Demand for budded citrus and mango trees is growing rapidly and expansion cannot keep pace with it.

Yandev sold 4,456 budded trees compared to 3,561 in 1949 and 2,833 in 1948.

At Maiduguri 5,500 budded mangoes, 2,000 citrus and 8,000 guava, lime and pawpaw seedlings were issued from the Native Administration garden. It is estimated that some 124,000 fruit-trees are now grown in a fertile valley near Maiduguri known as the "Jere bowl".

Native Administration orchards are being increased in Sokoto Province.

VEGETABLES

34. Kano still remains the main centre of the vegetable trade. The Department maintains supplies of vegetable seeds for the growers who purchase an average of £30 worth monthly. The total railings of onions, tomatoes and other vegetables amounted to 3,265 tons from this centre.

Irish potatoes are grown on the Plateau, where conditions are most suitable, and to a lesser extent near Zaria. The crops were good and prices high, varying from £20 to £50 per ton according to season.

Some 15,000 lbs of vegetables were sold for growers through the Native Administration "shop" in Maiduguri.

AGRICULTURAL SURVEYS

35. All stations have collected figures of crop yields for the world census of Agriculture. It is regrettable to state, but nevertheless true, that little reliance can be placed on these returns. There are insufficient trained assistants to carry out the work on the scale required. Suspicion of the motives of those taking the observations is nearly always present, though in spite of this the yields given have tended on the whole to be unbelievably high.

An agronomic survey of fifty-three villages in Ilorin Province is being conducted and is yielding some useful data on the proportions of crops planted and the ratio of population to land.

KASHIN YAWO (*ACANTHOSPERMUM HISPIDUM*)

36. Large scale spraying trials on Kashin Yawo infested areas in Kano were carried out from July to October. An estimated 921 acres were treated with 2-4D weed killer at 2 lbs per acre rate of application. Four types of sprayer were used: the Tifa fogging machine, the Ransome Sprayer, the Allman Plantector Sprayer and the Mysto Ox-cart Sprayer. All were reasonably satisfactory in operation. The Tifa gave the best cover, the other tractor sprayers were continually in trouble with choked jets and the Mysto relying for pressure on a hand-pump, gave an erratic performance depending too much on the human element. Dusting was also tried, but abandoned on account of the large quantity of diluent dust making it impractical.

Costs worked out at around 12s per acre not including depreciation on tractors or overheads.

Although success has been attained in killing the weed, a most disturbing factor is that observations on seed germination reveal that:—

- (1) Dormancy appears to be the rule. Seeds collected in 1948 are germinating, while only a small percentage of fresh seeds will germinate.
- (2) Spraying with 2-4D does not appear to affect germination.
- (3) Apparently immature seed will germinate.

Hopes of complete eradication have, therefore, receded over the last year.

ALLEN COTTON

37. The increased demand for cotton seed for planting, which started in 1947, was maintained ; the actual increase of 1899 tons over that of the previous year was the highest in any one year. Comparative figures for distribution on a provincial basis are as follows :—

SEED DISTRIBUTIONS IN TONS

<i>Province</i>	1947	1948	1949	1950	<i>Percentage Increase over 1949</i>
Katsina	1,947	2,442	2,666	3,315	24
Sokoto	1,536	1,727	2,095	2,856	36
Zaria	1,095	1,164	1,325	1,508	14
Bauchi	319	346	442	550	24
Kano	344	387	388	498	28
Niger	355	311	476	539	13
Plateau	21	34	105	103	—
Other Provinces ..	38	57	79	106	34
TOTAL ..	5,655	6,468	7,576	9,475	

In the main cotton growing areas of Katsina, Sokoto and Zaria Provinces, the season was favourable and in spite of excessive boll shedding, yields were average. In the more northern areas, due to late onset of rains, planting in general was later than usual, but the crop benefited from the moist conditions which continued late and even the very late planted cotton produced some crop. In Niger Province yields were below average due to late planting and early cessation of rains.

Thirty-eight new markets were opened and one old market was not gazetted giving a net increase of thirty-seven and a total of 132. These figures are exclusive of two markets in Benue Province and one market in Kabba, where buying begins at a much later date for a crop of mixed varieties which is graded for freedom from dirt only. There was no shortage of imported textiles, and purchases for the local trade were not abnormal, except in the Challawa area, not far from Kano City, where the demand for local spinning and weaving made inroads on sales in the gazetted market. The price for seed-cotton in the local markets was generally slightly higher than in the gazetted markets.

Purchases of Allen seed-cotton for all grades was 40,862 tons, of which 624 tons was Grade NA III, leaving a balance of 40,238 tons export grades compared with 31,417 tons in the 1949-50 season.

After ginning this should produce 72,000 bales or upwards of lint, compared to 64,252 bales in 1949-50. This season's figure creates a record, the previous highest being 65,953 bales.

Comparative figures on a provincial basis, according to markets are as follows :—

PURCHASE OF SEED-COTTON IN TONS

<i>Province</i>	1947	1948	1949	1950
Katsina	6,171	12,061	13,425	15,352
Sokoto	1,539	6,966	8,971	15,548
Zaria	1,794	4,992	5,908	5,965

PURCHASE OF SEED-COTTON IN TONS—*continued*

	1947	1948	1949	1950
Niger	320	776	1,847	1,673
Kano	—	—	—	60
Bauchi	7	413	1,072	2,011
Plateau	31	108	194	253
	<u>9,862</u>	<u>25,316</u>	<u>31,417</u>	<u>40,862</u>

The rapid expansion in Bauchi Province continues, sales of seed-cotton increased from 1,072 tons in 1949 to 2,011 tons in 1950. There was a small retrogression in purchases in the Niger Province, which showed a drop of 174 tons of seed-cotton, in spite of the distribution of sixty-three tons more seed.

Returns of seed-cotton purchases in tons for every ton of seed distributed show a progressive increase in Bauchi Province, a sudden jump in Sokoto Province and decreases in Katsina, Zaria and Niger Provinces.

Figures for the five main producing areas over the past three seasons are as follows :—

TONS OF SEED-COTTON PURCHASED FOR ONE TON OF SEED DISTRIBUTED

<i>Province</i>	1948	1949	1950
Katsina	4.9	5.0	4.6
Sokoto	4.0	4.2	5.4
Zaria	4.3	4.4	3.9
Bauchi	1.2	2.4	3.6
Niger	2.5	3.9	3.1

The reintroduction of NA Grade III was at first received with a great deal of suspicion by the farmers, especially so at the beginning of the marketing season, when most of the cotton was graded as NA III, and there were indications of reluctance to go to the gazetted markets. They soon got over these feelings and marketing proceeded as usual.

The percentages of three grades for total purchases are as follows :—

Grade NA I	78.0
Grade NA II	20.4
Grade III	1.6

There is, however, wide variation of the different grades between the areas. The lowest percentage of Grade III was in Sokoto Province at 0.6 per cent, the highest in Niger Province at 8.4 per cent. For Grade NA II, Sokoto is again the lowest at 7.1 per cent as compared with the highest, viz. 53.2 per cent in Bauchi. Sokoto had the highest percentage of Grade NA I at 92.3 per cent and Bauchi the lowest at 45.4 per cent.

An ideal season and the use of superphosphates contributed to a tremendous increase in Strain 26C Allen cotton seed available for distribution in 1951 and enabled the accelerated scheme to be carried out completely and give a surplus of stage four seed.

This surplus was sufficient to satisfy the seed requirements of the Kontagora and Zuru Divisions of Niger Province, and was earmarked for these areas but lack of transport precluded this move and the surplus was absorbed in the Sokoto Province together with Commercial Allen.

Twenty-one acres of Stage 0 were planted with acid treated seed and, in spite of heavy boll shedding, gave an average yield of 538.1 lbs seed-cotton per acre, with a seed return of 3.1 tons, sufficient to plant 360 acres of Stage 1.

145 acres of Stage 1 were also planted at Daudawa, giving an average yield of 400 lbs per acre.

By ploughing back some seed in one or two of the stages, sufficient seed has been distributed to plant the acreages of the accelerated scheme as under :—

Stage 1	..	..	..	..	..	..	380 acres
Stage 2	..	..	..	..	..	..	3,300 „
Stage 3	..	..	..	..	..	..	22,810 „
Stage 4	..	..	..	..	..	..	95,920 „

The whole of the Funtua Ginnery area, which this year includes four markets in Zaria Province, will be under Stage 4 cotton this coming season.

Reliable ginning percentages can be given only for the cotton ginned earlier in the season, as some ginning was done at night and Departmental Officers were not in attendance.

Comparative ginning percentages over the last three seasons are as follows :—

				1948-49	1949-50	1950-51
Stage 0	..	..	..	37.80	35.98	35.55
Stage 1	..	..	..	37.48	36.36	36.00
Stage 2	..	..	..	35.88	35.36	34.12
Stage 3	..	..	..	33.87	34.69	34.08

There has again been a drop in the ginning percentages, the biggest being between Stages 1 and 2.

Reports on the work of the Cotton Breeder and the Entomologist provided by the Empire Cotton Growing Corporation are included in the Botanical and Entomological sections respectively.

A grant has been made by the Cotton Marketing Board for the establishment of a 600-acre Cotton Multiplication Farm at Daudawa to accelerate future waves of seed. This Board has also undertaken payment of a team of eight Cotton Cultivation Officers to carry out work on the crop and detailed propaganda. These officers reached the country in November 1950, and did valuable work on propaganda for clean-picking, and uprooting old cotton stalks.

RESEARCH IN NORTHERN PROVINCES

A.—Introduction

The main centre for dealing with research problems in the Northern Provinces is situated at Samaru near Zaria. The resident staff consists of officers of the Botany and Chemistry Sections ; no member of the Entomology Section is resident at Samaru. The staff position has been no better than in previous years and for some considerable time there was no Chemist available.

2. At Samaru are also resident a Plant Breeder and an Entomologist who have been seconded by the E.C.G.C. to work on cotton problems. The Department is greatly indebted to the Corporation for this and their services are greatly appreciated. With their consent and help mention is made of their work in the following report.

3. Throughout the year the main lines of work concentrated on have been the study of the fertilizer requirements of the main cash and food crops of the Region and the improvement of the crops by the Plant Breeder. Investigations continue on the problem of maintaining soil fertility without manures but using variously controlled leguminous and grass fallows and also investigations to determine how the limited manure available can be most economically utilised.

4. A system for recording all experimental work has been gradually built up and it is now believed that all available information on past experiments has been accumulated. These new details have been included in existing summaries and the copying of these summaries on to punched cards for easy sorting is proceeding. A start has been made on the production of a cyclostyled summary of the experiments carried out at each station. The specialists' library has also been improved.

B.—Botany Section

COTTON

5. *Season*.—For cotton the season was a good one, rainfall was adequate for planting in early July and very good stands were obtained in almost all plots. Subsequent growth was slow and irregular, however, and remained backward until early September when higher temperatures were accompanied by strong growth which continued until the plants in some plots were well over six feet high. This heavy vegetative growth did not lead to efficient early fruiting but resulted in the plants producing a framework which eventually carried many potential fruiting points so that, in spite of heavy shedding, the average yields finally obtained were good. In contrast to last season the picking period was very much later.

6. *Pests and Diseases*.—A full review of the observations collected this season has not yet been made. One notable feature was the relative absence of typical angular leaf spot caused by *Xanthomonas malvacearum* this season compared to last. It is thought that lower temperatures were responsible for this since infection was present and eventually considerable "blackarm" symptoms developed and also much mummifying of small bolls which is perhaps to be attributed to this disease. On the breeding plots bollworms were at no time very conspicuous but the first picking contained a considerable amount of bollworm damaged material. Jassid infestation, perhaps as a result of the continued vegetative growth, was higher, and damaged strains which had appeared reasonably resistant last season.

7. Tattering and fretting of leaves ascribed to *Campylomma* sp. was heavier and more widespread than last season but erratic in distribution. Varietal differences in susceptibility were again found but have not yet been fully analysed. Stainer was scarce. No leaf-curl could be found on cotton at Samaru though some strains of high susceptibility from the Sudan were grown on alternate ridges with okra, many plants of which showed severe symptoms quite early in the season with a very heavy infestation of whitefly on both crops.

8. *Breeding and Selection Work*.—All the plantings of breeding stocks did well and have yielded much material for laboratory analysis. In particular a replicated progeny row test containing 128 progenies of 26C origin together with eight controls (the whole replicated seven times to give 952 plots) promises to give valuable results. Yields were particularly high in this experiment, the 26C controls averaging 933 lb S.C. per acre on net area. The best family has given a 21 per cent increase over 26C and the crude yield of the best single progeny an increase of 46 per cent, *i.e.*, a yield of 1,363 lb S.C. per acre.

9. The work of planting, harvesting and sampling this test proved a considerable task but was carried through without serious mishap. With the experience gained, and some refinements of method, similar tests in future seasons should prove easier. One very satisfactory feature was the extremely good stands obtained, averaging 99.1 per cent over the whole experiment and obviating all need to adjust the yields on this account. The seed was acid treated and no supplying was done. Amongst the numerical records of characters other than yield which it was possible to make and analyse statistically, was average weight per plant of thinnings. Highly significant differences were found between families and the weights appear to be significantly correlated with parent seed weight. Their relation to yield has yet to be investigated.

10. *Production of New Nucleus Stock of Samaru 26C.*—A new stock of seed for issue to Daudawa for sowing as Stage 0 in 1951-52 season was made up by a process designed to give a purified bulk, of substantially unchanged intrinsic character but reduced variability, in the shortest possible time. The method used is outlined below. It combines features of three different plant breeding techniques, *viz.*—the “Replicated Progeny Row Test” advocated by Hutchinson and Panse, the “Mass Pedigree System” used by Harland in Peru and the “filtering” or “modal bulk” technique used in the Sudan and Uganda.

11. The first step (carried out in 1949-50 season) was to select, from an area sown with the best existing stock of 26C, a large number of typical well-grown fruitful plants and to bring in their produce, keeping that of each plant separate, for laboratory examination. From these, all plants whose values for ginning percentage, seed weight and lint length were outside certain limits were rejected (or, if the divergence was in an upward direction, set on one side for separate tests). These limits were set on either side of the mean value but a bigger divergence was allowed in an upward than in a downward direction, particularly in the case of lint length, and the limits for one character were not applied rigidly without reference to the level of others.

12. Of 300 plants brought in about half survived this “screening” process. A considerable number of the rejections were plants showing a combination of short lint and high ginning percentage but the mean ginning percentage of plants surviving was maintained by the rejection of an appropriate number with low ginning percentage. The ranges within one group of 200 plants, before undergoing this screening, have been given in the 1949-50 Progress Report to the E.C.G. Corporation.

13. The next step, carried out in 1950-51, was to carry forward seed of the chosen plants, still keeping each separate, to a replicated progeny row test. 144 progenies were grown, each with four replications. Examination in the field enabled seventeen of these to be rejected for jassid susceptibility or undesirable habit of growth. An early first picking of the remainder was then taken for rapid laboratory determinations of lint length, ginning percentage and seed weight using composite samples from the four replicates.

14. With the data so obtained, a second screening was then carried out based this time on progeny means. The variation shown by these was much less than that displayed by the 200 single plants in the previous season and much narrower limits could be set up. These were adjusted to retain about half the progenies, this being the number estimated as necessary to provide the seed needed. The actual number of progenies surviving this second screening was sixty-six and subsequent pickings of these, bulked together, have yielded over 200 lbs of seed, sufficient for a twenty-acre multiplication area.

15. The picking weights are not yet analysed but the crude figures indicate that, at least as regards the second screening, selection to improve uniformity in laboratory characters has not resulted in the rejection of an undue proportion of the higher yielding components of the bulk stock. On the contrary there is a suggestion that, in addition to markedly reducing the range in length and ginning percentage, it has slightly improved the yielding powers. A check on this will be obtained from variety tests to be run concurrently with the multiplication.

16. *Variety Tests.*—Ginning and the analysis of the data are not yet complete. As all the experiments were laid out in some form of incomplete block experiment the crude yields are subject to adjustments on analysis and varietal comparisons made on the crude yields may not hold for the more accurate adjusted yields. Moreover the seed-cotton yields without the ginning percentages do not indicate the relative merit of varieties.

17. Nevertheless, figures are given below which are of some interest pending the availability of the final results :—

A21 (50): COMPARISON OF 26C AND ALLEN SEED STOCKS

<i>Seed</i>					<i>Crude yield S.C. (lb per acre)</i>
Rogued Nucleus Stock	..	..	..	..	848
Produce of 1949-50 Stage 0	..	..	..	..	728
Produce of 1949-50 Stage 1	..	..	..	..	797
Produce of 1949-50 Stage 2	..	..	..	..	757
Produce of 1949-50 Stage 3	..	..	..	..	748
Funtua NA (=Allen)	..	..	..	..	713
Zaria Native Administration	..	..	..	..	693
Wase Allen	..	..	..	..	734

18. The very heavily rogued nucleus stock shows an appreciable increase in yield over the other 26C stocks. Stage 0 produce has given a lower figure than the others. This is presumably a chance effect.

19. Averaging the figures for Stages 0 to 3 and comparing with the average of the three "Allen" stocks, gives 26C an advantage of 6.2 per cent in S.C. yield. This is in accord with the average of previous tests.

A22 (50) VARIETY TEST

<i>Strain</i>					<i>Crude S.C. yield lb per acre</i>
26C (Daudawa Stage 1)	..	..	..	..	696
26C derivative 4721	..	..	..	..	743
26C derivative 4724	..	..	..	..	716
26C derivative 4736	..	..	..	..	737
MU8	..	..	..	..	941
MU8 x BP52	..	..	..	..	739
MU8 x U4	..	..	..	..	725
UK48	..	..	..	..	651

20. The three 26C derivatives are not very conspicuously better than 26C itself in S.C. yield. MU8 has given an increase of about 35 per cent over 26C, repeating previous experience. This strain is too short-linted for growth in replacement of Allen. Two hybrids, with MU8 as one parent but of superior lint length, have not shown the high yielding power of MU8 itself. The Tanganyika strain UK48 has not done well this season.

21. *Other Experiments.*—Results from a number of other experiments await analysis and merit only brief mention of a few points of special interest meanwhile. BAR D28, an introduction noted last season as very promising, has given a rather lower yield than 26C so far but has more to come. The seed used for this test was obtained from the residue of the 1949-50 materials after picking out all the best plants for growth as progenies. These latter have again proved very attractive in appearance.

22. A test of acid-treated in comparison with untreated seed carried out by students of the Samaru School with the co-operation of the Principal, has indicated that, under the conditions prevailing in that experiment, acid treatment does not add much to the final yield. Even with very good moisture conditions at planting, however, it gave significantly earlier germination and a significantly higher stand, with the better early growth persisting long enough to be reflected in a somewhat higher first picking. There was also a distinguishable difference in black-arm infection in October although this disease was not serious.

23. A trial of "Phyomone", a proprietary brand of a growth regulating substance, has given a result of some interest though no immediate practical value. This substance, used in apple and pear orchards to check fruit fall, appeared to have some slight effect in reducing shedding and increased the weight of the first picking which however was at the same time reduced in "grade" having clearly more diseased locks in it. Later pickings showed no effect so that the difference on total yield was insignificant.

GUINEA-CORN

24. *Breeding.*—Plant breeding work has continued and mass and pure line selection in the local types has been undertaken. Work has also continued on a shorter local type of the Kaura class with compact yellow grained heads. Single plant selection work has been done within the strain and the strain has also been used in hybridisation work to combine the sturdy dwarf character with the more popular white grained farfara type. Crosses have been made with introduced "combine" sorghums from the United States to gain a combination of the desired characters from both parents.

25. *Striga resistance.*—Single plant selections of unattacked local plants in a heavily infested plot have been made and these sown as progeny rows in the same land in 1951 to see if any resistance has been inherited.

MILLET

26. Selection work with early maturity as the main character continues. It is hoped that a high yielding strain which matures in less than seventy-six days will shortly be achieved.

PROSO

27. Agronomic work on this crop continues but satisfactory yields have not as yet been obtained but early planting (before the beginning of June) seems essential.

MAIZE

28. A small trial with some introduced hybrid corns from U.S.A. was carried out and the yields were very promising for the area as many were over 2,000 lbs of grain per acre. A series of hybrids of varying lengths of maturity has been received from Michigan State College, U.S.A. and we have been assured that the parental inbred lines are available. Should they prove successful and should the increase in yield warrant the expense a scheme for producing and distributing hybrid seed may be initiated.

RICE

29. Work with upland rice continues using imported varieties—Calero, Fortuna and Atebebu as well as the local varieties—Agbede Oshodi. Yields on Samaru farm which is typical of the upland farming areas of the district are very variable being only rarely up to 900 lbs per acre and often as low as 200 lb. On this type of land results depend too much on an adequate rainfall and the chances of crop failure are great. Better success was had with a small plot of Calero on a wetter part of the farm. Twenty-five new strains were imported from Borneo, Siam and Australia and others from India are expected soon; these are being kept under observation.

GROUNDNUTS

30. *Varieties.*—The experiment to test the hypothesis that the mixing of a number of high yielding strains in predetermined proportions should give higher yields than any one of the high yielding strains as a pure crop was continued. The results for 1949 and 1950 were as follows:—

<i>Seed (Percentages in mixture)</i>				<i>Position</i>		<i>Lb decorticated Nuts/Acre 1950</i>
<i>S38</i>	<i>Mf374</i>	<i>Castle Cary</i>	<i>ML3,710</i>	1949	1950	
100	—	—	—	2	1	1,122
50	50	—	—	1	2	1,100
50	—	50	—	5	3	1,075
25	25	25	25	4	4	1,047
—	—	100	—	6	5	1,003
—	100	—	—	8	8	973
—	—	—	100	9	7	980
—	75	25	—	7	6	993
50	—	—	50	3	9	937

It is interesting to note how Samaru 38 by itself or as part of a mixture has maintained itself in the top group each year.

31. The main variety trial which was started in 1946 (1945 results were cancelled as severe flooding made the yields valueless) has continued. It had been found that in trials the relative performance of our best locally bred strains varied from year to year depending no doubt partly on the unpredictable climatic conditions of the season. Because of this it was decided to test the same strains each year so that a final assessment could be made as to their average performance. Varieties Tudun Wada and Ba

Gwariya used in 1949 were replaced by Kano 50 and Samaru 38 ex Kontagora. The latter was included because reports from Kontagora showed how well this strain was doing while Kano 50 is the new strain being multiplied up for distribution in the Kano area. It is closely related to the older strain Kano 38 which had proved itself so outstanding in this area but in a long series of trials Kano 50 had proved itself even better. The results of these trials to date are shown below :—

Variety	Position in Samaru Trials					Decorticated Nuts per Acre	
	1946	1947	1948	1949	1950	1950	Average 1946-50
No. of Varieties in Trials							
Natal Common	—	—	—	1	15	747	(1,066)
MK.383 ..	15	2	7	2	1	1,140	1,006
Kano 38 ..	6	1	9	7	8	988	980
MJ.374 ..	1	7	2	4	6	1,005	980
MJ.371 ..	2	10	6	3	2	1,110	979
Castle Cary ..	10	6	1	6	3	1,045	975
MD.351 (Kano 50).	—	—	—	—	10	947	(947)
MK.374 ..	5	3	11	5	7	997	944
Samaru 38 ..	11	5	4	12	4	1,026	936
ML.384 ..	16	4	10	9	9	949	928
ML.378 ..	8	17	7	8	5	1,025	922
MG.371 ..	4	20	5	10	12	840	884
ML.3,710 ..	12	19	3	13	11	873	875
ML.372 ..	2	15	12	11	13	788	865
S.38 ex Kontagora	—	—	—	—	14	775	(775)

Per cent

Significant difference	0.1	= 269
	1	= 218
	5	= 163

32. The yield of Natal Common in 1950 was low (14th out of fifteen varieties) but its two-year average still places it on top of the list. MD.351 and S.38 ex Kontagora figures are based on only one year's results and should not be considered as being in correct position. It is still difficult to draw definite conclusions about these varieties. The first four in 1950, *i.e.*, MK.383, MJ.371, MJ.374 and Castle Cary are maintaining a good performance. Kano 38 is still close to the top due to its good performance in 1947. The trial is being repeated in 1951.

33. *Seed Dressings.*—In 1948, a seed dressing trial was conducted using mercurial and non-mercurial powders. The results showed that the non-mercurial dressing was superior. The 1950 experiment was undertaken to confirm the above results and to determine the best rate of seed dressing application and rate of seeding. In 1950, the best yield was obtained from the non-mercurial compound at a planting rate of two seeds per hole and at four ounces powder per 100 lbs seed.

34. *Selections*.—In 1948, 405 single plant selections were made from newly collected local types from all parts of the Northern Provinces. On the basis of unthreshed weights, all but eighty of these were discarded in 1949. In 1950, forty-eight of these eighty strains were tested against Samaru 38. Reselection within these eighty strains was also carried out and the 1949 discards were bulked and reselection was undertaken in 1950. Of the forty-eight selections planted in 1950, thirty-five gave higher yields than Samaru 38. Of these, six were significantly higher at 0.1 per cent than Samaru 38. Yields ranged from 1,260 to 1,564 lbs per acre undecorticated nuts.

SOYA BEANS

35. *Varieties*.—An experiment was designed to compare three new introductions, Avoyelles, Mamloxi and Acadian against our previously found best variety Benares. Samaru spacing had always been twelve inches but results elsewhere suggested that higher yields were obtained with a six-inch spacing on a three-foot ridge. Results confirmed Benares as the best with a yield of 952 lbs per acre which was significantly better than that of Mamloxi and Acadian. Differences due to spacing were not significant although there was a tendency for the closer spaced plots to yield more heavily.

BENNISEED (*SESAMUM INDICUM*)

36. *Selections*.—Selection work on this crop continues with the object of producing high yielding and also early maturing strains.

37. *Introductions*.—Strains from Venezuela and Trinidad were introduced and special attention is being given to the single stemmed varieties which ripen their crop more uniformly.

SUNFLOWER

38. The four most promising varieties so far introduced were tried in a variety trial and the following results obtained :—

Saturn	..	..	..	..	..	1,049 lbs seed per acre
Grant Grey seeded	..	..	..	..	..	983 lbs seed per acre
Hungarian	..	..	..	..	..	893 lbs seed per acre
Sunrise	..	..	..	..	..	513 lbs seed per acre

CASSAVA

39. Locally produced clones were tested and a trial to test the reduction in yield caused by cassava mosaic was carried out. In the latter trial reduction was only slight and it appears preferable to breed for high yield regardless of resistance which may or may not be correlated with high yield.

WEED CONTROL

40. The sodium salt of 2, 4, 5-T (Trichlorophenoxy acetic acid) was tried on local shrubby weeds such as *Isoperlinia doka* which on account of their annual regrowth are difficult to eradicate from farm land. Some success has been obtained but further work is necessary.

41. *Acanthospermum hispidum* is still one of the major weeds of communal grazing lands in the Northern Provinces and the Botanical Section has undertaken some germination tests.

MISCELLANEOUS CROPS

42. Work has been done on other crops which are not mentioned in detail but owing to staff shortages it has not been possible to expand it as would be desirable. Some pasture work has been done and many introductions made including strains of safflower, sugar cane and sundry legumes.

C.—Chemistry Section

FIELD EXPERIMENTS

43. *D.N.P.K. Trials.*—Experiments to determine the relative long-term effects of fertilisers and organic manures and their interaction have now been laid down at Sokoto, Daura, Kano, Daudawa, Samaru, Bida, Yandev and Ilorin ; it is hoped to add Maiduguri and Yola to the list in the coming year. The effects are tested by means of the local crop rotation and results will be reviewed at the end of a cropping cycle.

44. *Superphosphate Granules : Oversize.*—The North Region Development Board issued free in 1950, 1,000 tons of superphosphate in the form of oversize granules with a mean weight between half and one-third that of the stand-dosage pellets (1.4 gm.) used in 1948 and 1949. At the Fertiliser Training Course given at Samaru in 1950, demonstrators had been taught to place granules to the side of the seed. There was, however, a chance that farmers would drop granules on top of the seed, and it was necessary to know what damage might result with both groundnuts and guinea-corn from the random dropping of seed and granules.

At Zonkwa, Bida, Daura, Kano, Kafinsoli, Gusau and Kontagora a standard experiment was made in which (i) one full-sized pellet (ii) two half-sized granules and (iii) three one-third-sized granules were dropped with no attempt to separate seed and fertiliser. Blanks were supplied only at the rate required by the no-manure plots.

(a) Groundnuts.

(i) *Germination.*—At all stations random dropping of seed and granules led to a significant reduction in germination, the greatest effect being observed at Kafinsoli where the use of medium-sized granules reduced percentage germination from 50.4 (no fertiliser) to 25.0. Germination was poor (probably the result of drought) in the non-manured plots at all stations, only Gusau recording a percentage germination greater than 65. The overall percentage germination was :—No Manure 53.1, Large pellet 43.1, Medium granule 38.7, Small granule 38.7 (Significant difference 1 per cent = 8.6). It will be seen that both medium and small granules caused a greater reduction in germination than the full-sized pellets ; the difference was not significant.

(ii) *Yield.*—Kernel yields have been received from seven stations. They show no significant overall reduction in yield due to fertilisers despite the effect on germination. Yields in lb/acre are :—No Manure 702, Large 757, Medium 733, Small 739. At Kano, Bida, Zonkwa and Gusau fertilisers had no significant effect. At Kafinsoli there was a significant depression (No Manure 1,113, Large 913, Medium 920, Small 1,033), whilst at Maigana and Daura there was a significant increase due to all sizes of granule (No Manure 765, Large 1,011, Medium 971, Small 1,045 Daura).

(b) *Guinea-corn.*

(i) *Germination.*—The overall depression in germination was slight and not significant :—No Manure 85.3, Large 78.9, Medium 79.1, Small 79.3. Results from the various stations were, however, very variable. There was no noticeable effect at Daura, Kano or Kafinsoli : there was significant depression at Gusau and Bida (*Bida.*—No Manure 86.0, Large 52.5, Medium 48.0, Small 41.5) ; at both Zonkwa and Kontagora fertilisers improved germination, the effect being non-significant (*Kontagora.*—No Manure 66.0, Large 78.0, Medium 86.5, Small 75.0)

(ii) *Yield.*—Grain-yields have been received from seven stations. At all stations except Bida there was some increase due to fertilisers, the overall yields being highly significant. Yields per acre were :—No Manure 527, Large 633, Medium 648, Small 625. There was no noticeable effect at Kano or Kafinsoli, large increases at Daura, Kontagora, Zonkwa and Gusau, the last three being significant (*Gusau.*—No Manure 337, Large 584, Medium 647, Small 547). The depression at Bida was not significant despite the marked detrimental effect on germination (No Manure 602, Large 633, Medium 545, Small 513).

45. *Superphosphate Granules : Normal Commercial Size.*—Oversize granules have cost £4 per ton more than the small granules. It has been considered advisable to face a possible fall in oil-seed prices by reducing the cost of fertilisers as far as possible. It has also been thought advisable to use a standard size of granule in view of the present uncertainty as to which country can supply Nigerian fertiliser requirements.

In 1951, although oversize granules will be offered for sale in areas in which they were distributed free in 1950, the new free issues will consist of small granules.

Preliminary tests of small granules were therefore made in Samaru in 1950. They were found to be as effective as the pellets and oversized granules previously used. When placed by a standard scoop (*see* paragraph 48) to the side of uncovered groundnut seeds there appeared to be no danger comparable to that caused by superphosphate powder.

KERNEL YIELD LB/ACRE

	<i>No earthing</i>	<i>Seed earthed</i>	<i>Fertiliser earthed</i>	<i>Mean</i>	<i>Diff. No. M.</i>
No Manure	—	—	—	492	—
Powder	462	743	794	666	+ 174
Normal Granule	714	747	666	709	+ 217
Oversize	740	737	760	746	+ 254
Mean	639	742	740	653	—

Fertiliser Effect Sig. Diff. 1 per cent = 176.

Placement Effect Sig. Diff. 5 per cent = 73.

46. *Gypsum with Groundnuts.*—Experiments have been continued at Kontagora, Kano and Samaru to find whether superphosphate can profitably be replaced by more soluble phosphatic fertilisers. Undertaken in the first place to try to take advantage

of the lower transport cost involved in the handling of the more concentrated materials these trials have gained importance from a present world shortage of sulphur which may drive us to the use of fertilisers manufactured without sulphuric acid.

By splitting superphosphate into its two constituents, monocalcium phosphate (triple super) and calcium sulphate (gypsum) it has been shown that the phosphate plays the major part in the development of kernels, and that gypsum is primarily concerned in haulm formation. The gypsum effect is different at Kontagora, where it has a direct influence on both kernel and haulm formation, and at Samaru where its effect arises largely by interaction with phosphate. It is hoped during the present year to decide the relative contributions made by calcium and sulphate to this very striking action of gypsum.

A mixture of triple super and sulphate of ammonia has an immediate effect on groundnuts similar to that of superphosphate. It is doubtful whether this soluble mixture could be safely placed with groundnuts by the technique now in use. Trials with guinea-corn will be made during the coming year and the residual effect tested by groundnuts. So far there is no record of a residual effect from sulphate of ammonia. At Kontagora gypsum has shown a significant residual effect on haulms in plots dusted with 100 lbs gypsum per acre in 1948. No fertilisers were applied in 1949 : a dressing of 40 lbs triple super per acre was given to all plots in 1950. Yields of kernels and haulms have been :—

KERNELS LB/ACRE

	No Gypsum	Gypsum	Difference	Per Cent No Gypsum
1948	678	785	+ 107	15.8 Significant 1
1949	459	528	+ 69	15.0 Significant 1
1950	532	565	+ 33	6.2 Non-significant

HAULMS (LB/ACRE)

	No Gypsum	Gypsum	Difference	Per Cent No Gypsum
1948	1,154	1,403	+ 249	21.6 Significant 1
1949	1,728	2,100	+ 328	18.5 Significant 1
1950	1,095	1,220	+ 125	11.4 Significant 1

47. *Residual Effect Superphosphate : Kano.*—Reference has been made in previous reports to the persistent residual effect of superphosphate applied to sorghum at Kano in 1947. The residual effect was again tested by groundnuts in 1950. All superphosphate treatments were better than no manure. The difference between no manure and any one treatment narrowly missed significance at 5 per cent ; the combined effect of manures was, however, significant at 1 per cent.

(KANO 1947-50 DIRECT AND RESIDUAL EFFECTS OF SUPERPHOSPHATE LB/ACRE)

<i>Treatment</i>	1947 <i>Sorghum grain</i>	1948 <i>Groundnut kernels</i>	1949 <i>Groundnut kernels</i>	1950 <i>Groundnut kernels</i>
No Manure	776	827	472	455
Super 50 lbs (line) ..	+ 123	+ 232*	+ 138*	+ 88
Super 100 lbs (line) ..	+ 323*	+ 383*	+ 193*	+ 101
Super 200 lbs (line) ..	+ 361*	+ 438*	+ 170*	+ 125
Super 50 lbs (hole) ..	+ 341*	+ 390*	+ 208*	+ 105
Super 100 lbs (hole) ..	+ 348*	+ 226*	+ 169*	+ 76
Super 200 lbs (hole) ..	+ 365*	+ 359*	+ 138*	+ 73
Significant Difference 1	258	135	122	No Manure <i>versus</i> Combined Manures: Sig. Diff.=80.

FERTILISER COURSE

48. At the request of the Fertiliser Officer, a second Fertiliser Course was given at Samaru on 25th and 26th January, 1951. At this course members of the fertiliser teams spoke with enthusiasm of the results obtained in their Provinces, and no case of impaired germination or damage to seedlings was reported except that due to drought, which in one area had been wrongly attributed to fertilisers; there were, in fact, reports that fertilised plants had withstood drought better than the non-manured. It was thought advisable to demonstrate a photograph which showed damage from faulty placement at Kafinsoli; potted plants in which germination had been impaired by contact with fertiliser were also exhibited.

One of the main purposes of the 1951 course was to demonstrate the application of small granules by means of standard scoops. It had been intended to supply double-ended spoons, one end to deliver 1.4 gram (groundnuts) the other 5.6 grams (guinea-corn).

As a result of the present scarcity of metals difficulty was experienced in obtaining scoops, and those finally supplied (two days before the course opened) were without handles; they had a short metal lip which could be easily and firmly fixed into a piece of guinea-corn stalk. Stalks of various lengths were tried during the training course. Whilst with a stalk about fifteen inches in length it was possible, without bending, to place the granules with great accuracy, a stick of this length proved awkward to handle in one-man placement in which a divided calabash containing seed and granules was held in the crook of the left arm. It was, however, interesting to hear from fertiliser officers that when left to their own devices farmers had usually employed two people; one to drop seed, the second to drop fertiliser: when this method had been demonstrated in 1948 it had been criticised on the ground that the two people could have planted two lots of groundnuts in the time taken to plant seed and fertiliser!

When a second person is available for placing only fertiliser this can be done quite easily by using a long stick and carrying the granules in a deep (henna) calabash suspended on a string. There seemed, however, no aversion to bending on the part of even the oldest of the trainees and the general preference was for a handle as short as possible or none at all. It seems not unlikely that with the scoop to guide him the farmer will be able to use the small granules in the same way as the oversize granules, *i.e.*, by picking up with his fingers a fairly accurate dosage.

MISCELLANEOUS

49. Analyses of the juices of a number of varieties of sugar-cane have been made for the Agricultural Officer, Zaria; the feeding values of hay prepared at different times of the year have been determined for Samaru School and various samples of silage have been examined. Preliminary trials of sodium trichloracetate as a control for Dhuh grass (*Cynodon dactylon*) have been made and determinations of the C/N ratios of soils from Mokwa and Kontagora Groundnut Farm are in progress to find whether the ratio has an effect on the gypsum requirement of groundnuts similar to its effect on the need for sulphate of ammonia which has been observed on Voltaian soils in the Gold Coast.

D.—Entomology Section

LOCUSTS

50. Swarms of the Desert Locust (*Schistocerca gregaria*), reached the Northern Provinces of Bornu and Adamawa in December. Between that month and January, five swarms were seen. No egg-laying or hopper bands were observed and none of the specimens received at Ibadan was sexually mature. Since January, no swarms have been reported although a few scattered individuals were present in Bornu in March. Full preparations have been made to deal with hopper bands should they occur.

51. Observations on the solitary phase of the African Migratory Locust (*Locusta migratoria migratorioides*) were continued by Mr H. B. Johnston (Anti-Locust Liaison Officer) until August. These studies included observations on ecological conditions in the fadamas, egg-laying, seasonal movements and population density.

52. The above officer returned to Bornu in October and the following notes are abstracted from his reports and from those of the Entomologist who took over from him in February. Breeding at the latter part of 1950 was unusually intense, and four concentrations were observed. In three of these, all the individuals were in the solitary phase but the fourth contained some 30 per cent of individuals showing gregarious features. Fortunately no further increase in numbers took place and by March the concentrations had dispersed; nevertheless, the scattered locusts which remained were more numerous than in previous years. The concentration containing gregarious individuals was the last to disperse and a few hoppers were still present in March.

53. As yet only three locusts of the many hundreds marked to study seasonal movements have been recovered. One specimen, marked in October 1950 was recovered in March some twenty miles upwind from the original marking site. The other two had not travelled any distance.

54. In the laboratory attempts have been made to discover the types of soil in which successful oviposition can occur. Eggs have been laid in moist sand and in the black cotton soil ('firki). This is of considerable importance in delimiting oviposition sites in the field.

COTTON

55. *Bollworms*.—Specimens of Red Bollworms from Nigeria have been examined at the British Museum and found to be different from the East African species, *Diparopsis castanea*: the Nigerian species has not yet been described. Population counts of immature stages were continued; egg laying reached a higher magnitude than in 1949 but larval mortality was proportionately greater and thus the total population was evened out. Total numbers of Red Bollworms exceeded all other bollworms. The Pink Bollworm, *Platyedra gossypiella*, was scarce in 1950. Of the minor bollworms the two species of *Earias* were the most important.

56. *Cotton Stainers* (*Disdercus supersticiosus*).—The sporadic appearance of these insects appears to be related to their alternate hosts in the surrounding vegetation. In future detailed studies of the life history will be made to assess the importance of certain crops as alternate hosts.

57. *Minor Pests*.—It is possible that some of the leaf tattering damage previously attributed to *Lygus* sp. is caused by *Campylomma* sp. Populations of *Lygus* were very much smaller (1 per cent) than those of *Campylomma*. As, however, a single *Lygus* nymph can severely cripple a plant it cannot be assumed that *Campylomma* causes much of the damage. Both *Campylomma* and leaf tattering were greatest on the variety 26C. *Helopeltis sanguineus* was recorded at Kontagora, i.e., well outside its normal range.

58. *Crop Loss*.—In 1950, boll shedding was appreciably higher than in 1949. On the whole rather less than half of the sheds were damaged by bollworms. With regard to damage to non-shed bolls this season's cotton was much cleaner than the 1949 crop. Damage varies not only from season to season, but between different stations in the same season, and in different parts of the same station. This is probably accounted for by the previous crops in vicinity, the surrounding vegetation and climatic differences. Experiments on the optimum sowing date confirmed that the first half of July is correct. Earlier sowings allow increased pest populations and later sowings have an adverse effect on yield.

1950 MONTHLY RAINFALL RECORDS

	ADAMAWA—Kofare				BENUE—Yandev				BORNU—Maiduguri				ILORIN—Ilorin			
	(a) Rainfall 1950	(b) Rainfall Average 3 years 1947-49	(c) No. of Days Rain 1950	(d) Average 3 years	(a) Rainfall 1950	(b) Rainfall Average 23 years 1927-49	(c) No. of Days Rain 1950	(d) No. of Days Rain Average	(a) Rainfall 1950	(b) Rainfall Average 34 years 1916-49	(c) No. of Days Rain 1950	(d) No. of Days Rain Average	(a) Rainfall 1950	(b) Rainfall Average 45 years 1905-49	(c) No. of Days Rain 1950	(d) No. of Days Rain Average
January ..	—	—	—	—	0.35	0.32	1	0.69	—	0.02	—	—	1.48	0.21	3	1
February ..	—	—	—	—	—	0.74	—	1.08	—	—	—	—	—	0.69	—	1
March ..	—	0.34	—	1.0	2.55	1.31	2	2.95	—	0.01	—	—	1.24	2.08	4	3
April ..	1.40	1.69	4	4.0	3.35	4.01	7	7.13	—	0.27	—	—	4.10	4.12	9	7
May ..	3.79	5.32	6	10.3	8.38	7.10	19	13.00	—	1.59	5	—	6.04	6.62	11	11
June ..	6.21	5.95	11	10.0	6.50	8.00	12	14.43	1.28	2.77	4	—	7.19	7.67	14	14
July ..	2.46	6.58	8	12.1	4.04	5.19	10	12.91	0.88	6.95	16	—	6.02	5.27	8	11
August ..	6.20	7.38	11	12.6	2.21	6.94	5	16.69	12.31	8.68	19	—	2.06	5.00	4	9
September ..	8.38	6.47	19	13.3	7.72	11.14	13	20.00	4.15	4.18	15	—	4.55	9.71	11	18
October ..	2.55	0.52	5	2.0	6.57	8.80	14	16.56	2.46	0.71	2	—	3.74	6.93	12	14
November ..	0.32	0.12	2	1.0	0.20	0.63	4	2.34	—	0.01	—	—	0.16	1.21	1	2
December ..	—	—	—	—	—	0.18	1	0.60	—	—	—	—	—	0.27	—	1
TOTAL ..	31.31	34.37	66	66.3	42.33	54.36	88	108.38	27.16	25.19	61	—	36.58	49.78	77	92

	KATSINA—Daudawa				KATSINA—Daura				KATSINA—Kafinsoli				KANO—Kano			
	(a) Rainfall 1950	(b) Rainfall Average 24 years 1926-49	(c) No. of Days Rain 1950	(d) No. of Days Rain Average	(a) Rainfall 1950	(b) Rainfall Average 17 years 1933-49	(c) No. of Days Rain 1950	(d) No. of Days Rain Average	(a) Rainfall 1950	(b) Rainfall Average 18 years 1932-49	(c) No. of Days Rain 1950	(d) No. of Days Rain Average	(a) Rainfall 1950	(b) Rainfall Average 23 years 1927-49	(c) No. of Days Rain 1950	(d) No. of Days Rain Average
January ..	—	0.001	—	0.04	—	—	—	—	—	—	—	—	—	0.02	—	0.04
February ..	—	0.01	—	0.16	—	—	—	—	—	—	—	—	—	0.09	—	0.09
March ..	—	0.24	—	0.80	—	—	—	—	—	—	—	—	—	0.45	1	1.61
April ..	2.30	1.30	1	3.59	—	0.12	—	0.8	—	0.26	—	—	0.06	0.57	6	6.13
May ..	2.46	5.13	11	8.91	0.01	1.59	2	4.8	1.89	2.50	5	—	0.57	2.50	6	8.22
June ..	5.70	6.66	14	10.95	0.75	2.82	11	7.4	2.09	3.97	6	—	0.87	4.31	6	12.57
July ..	8.40	8.65	12	12.95	7.08	6.21	15	11.7	7.84	7.68	14	—	11.78	7.90	16	18.39
August ..	15.89	13.34	20	17.54	13.48	10.24	19	14.8	13.82	11.18	17	—	12.95	12.12	19	18.39
September ..	8.69	8.54	18	13.45	5.66	3.82	10	8.8	8.50	5.65	12	—	4.80	5.34	13	11.17
October ..	0.80	1.23	4	3.20	0.24	0.33	2	1.5	0.89	0.44	3	—	0.97	0.57	4	1.30
November ..	—	0.05	—	0.12	—	—	—	—	—	—	—	—	—	—	—	—
December ..	—	0.01	—	0.03	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL ..	44.24	45.16	80	71.74	27.22	25.14	49	49.8	37.03	31.68	57	56.33	32.00	33.30	65	59.52

1950 MONTHLY RAINFALL RECORDS

NIGER—Bida				NIGER—Kontagora				PLATEAU—Riyom				SOKOTO—Kasarawa			
(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Rainfall	Rainfall	No. of	No. of	Rainfall	Rainfall	No. of	No. of	Rainfall	Rainfall	No. of	No. of	Rainfall	Rainfall	No. of	No. of
1950	14 years	Days	Days	1950	3 years	Days	Days	1950	20 years	Days	Days	1950	21 years	Days	Days
	1936-49	1950	Average		1947-49	1950	Average		1942-49	1950	Average		1933-49	1950	Average
January ..	0.09	0.28	1	0.17	—	—	—	0.04	0.42	1	0.25	0.06	0.0006	1	—
February ..	—	0.28	—	—	0.48	—	0.33	—	0.89	—	2.50	—	0.0004	—	0.06
March ..	—	1.32	—	—	2.60	—	3.00	—	4.60	10	7.50	—	0.51	—	0.88
April ..	5.85	2.28	7	0.78	3.31	2	6.33	1.95	8.02	18	13.37	1.36	1.82	2	3.94
May ..	4.99	5.91	8	4.57	3.31	11	6.33	7.77	8.60	19	17.37	0.76	3.18	4	7.06
June ..	5.31	7.17	10	3.33	7.43	10	13.33	10.47	9.47	24	20.25	5.67	6.58	10	10.71
July ..	3.45	7.38	9	6.34	7.08	13	11.33	12.39	12.14	26	25.00	12.73	10.86	17	14.82
August ..	6.47	8.66	7	6.45	14.08	16	17.66	12.39	12.14	21	20.75	5.83	5.16	14	9.76
September ..	8.32	9.48	13	10.51	12.93	19	16.33	5.99	9.73	7	6.25	0.64	0.41	4	1.82
October ..	2.95	3.84	7	3.54	1.83	10	4.66	0.87	2.95	—	0.62	—	—	—	—
November ..	—	—	—	—	0.05	—	0.33	0.57	0.10	1	0.27	—	—	—	—
December ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL ..	37.43	46.60	62	35.69	49.79	82	73.30	48.07	55.58	127	114.23	27.05	28.5210	52	49.05

SOKOTO—Gusau				ZARIA—Maigana				ZARIA—Samaru				ZARIA—Shika			
(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Rainfall	Rainfall	No. of	No. of	Rainfall	Rainfall	No. of	No. of	Rainfall	Rainfall	No. of	No. of	Rainfall	Rainfall	No. of	No. of
1950	17 years	Days	Days	1950	24 years	Days	Days	1950	20 years	Days	Days	1950	21 years	Days	Days
	1933-49	1950	Average		1926-49	1950	Average		1924-49	1950	Average		1929-49	1950	Average
January ..	—	—	—	—	0.013	—	—	—	0.001	—	0.05	—	0.04	—	0.09
February ..	—	0.04	—	—	0.030	—	0.8	—	0.34	—	0.90	—	0.12	—	0.67
March ..	—	0.76	—	—	0.345	—	2.4	—	0.34	2	3.40	—	1.33	3	3.57
April ..	0.16	0.92	3	1.43	1.345	2	8.6	0.85	1.28	9	11.00	0.20	4.77	13	9.19
May ..	2.75	3.19	11	6.83	4.691	12	12.4	3.11	4.98	14	13.20	3.03	6.03	16	12.19
June ..	2.99	4.79	10	9.69	5.633	10	15.8	4.72	6.57	15	16.40	7.58	8.03	16	14.19
July ..	6.25	7.68	11	10.00	7.838	17	21.0	9.90	8.63	15	22.45	7.58	8.03	23	18.67
August ..	19.50	12.24	21	12.70	13.706	20	21.0	8.50	12.08	20	17.10	9.92	12.74	17	15.38
September ..	8.77	6.38	17	8.34	7.843	22	5.8	7.61	8.56	16	3.30	7.41	7.92	17	3.24
October ..	1.03	0.81	3	1.49	1.290	5	—	0.66	1.37	5	0.15	0.17	1.19	2	0.09
November ..	—	—	—	—	0.053	—	—	0.02	0.03	1	—	—	0.04	—	—
December ..	—	—	—	—	—	—	—	—	0.006	—	—	—	—	—	—
TOTAL ..	41.45	36.81	76	44.94	42.787	88	82.8	35.37	43.897	82	88.10	30.89	42.81	90	77.28

REPORT OF THE AGRICULTURAL DEPARTMENT: WESTERN PROVINCES AND COLONY

INTRODUCTION

No real improvement in the Senior Staff position took place during the year. Recruitment of new staff exceeded wastage by one, but the shortage of experienced officers still remains acute. As a result it has been necessary to continue the policy of concentrating on the most promising areas and lines of work.

THE 1950 SEASON

2. Rainfall was below average throughout the region with the exception of the south-eastern districts where exceptionally heavy early rains favoured the spread of maize rust (*Puccinea polysora*) recorded for the first time in Nigeria. The rust outbreak started in Dahomey and spread rapidly through Abeokuta and Oyo Provinces causing wide spread failure of the early maize crop. After an unusually severe "small dry", late season rainfall was fairly well distributed and apart from Northern districts crops were satisfactory.

Prices of staple foods rose steeply during the year due to a combination of factors, maize shortage caused by rust being one of the most important. Other factors were higher produce prices, and wage levels and the rapid development of the timber export trade all of which increased purchasing power and food consumption while diminishing labour available for farm work to some extent. Future food prospects are however quite encouraging as the high prices stimulated annual crop farming, and in most areas the acreages under cassava increased considerably.

Comparative prices for maize, yams and garri at Agege and Ibadan illustrate the general trend (prices per cwt).

	Maize		Yams		Gari	
	1950	1951	1950	1951	1950	1951
	s d	s d	s d	s d	s d	s d
Agege (January) .. : ..	20 0	60 0	18 0	30 0	20 0	50 0
Ibadan (January) .. : ..	18 0	35 0	10 9	25 0	18 6	44 0

GOVERNMENT FARMS AND N.A. FARM CENTRES

3. In general, fundamental research was confined to Government Farms while most Native Administration Farm Centres concentrated on demonstration of established practices and the supply of planting material and breeding stock for a limited area.

(i) Abeokuta Province :

Native Administration Farm Centres were maintained at Abeokuta, Ipokia and Otta though the latter was being closed at the end of the year. Herds of Local Muturu cattle maintained at all three were graded up to N'dama bulls, and a piggery for local production of breeding stock was maintained at Abeokuta.

(ii) *Benin Province :*

(a) *Ogba Farm Benin* :—With the posting of a Senior Service Officer to the Benin-Warri area once more, it was possible to revive some of the work at Ogba Farm. Scope was limited as the greater part of the farm is devoted to oil palm seed production and a long term *Acioa* fallow experiment. Efforts have been made to increase the output of fruit trees and oil palms from the Ogba Nursery both by improving management and increasing the area with a view to making this the main central Nursery for the Province and eliminating the small scattered Native Administration Nurseries which, for want of proper attention, have been giving most unsatisfactory results. A piggery for the production and distribution of breeding stock was established.

(b) Native Administration Farm Centres were maintained at Auchi and Irrua and smaller Demonstration Farms at Igarra and Sabongida. Cropping programmes consisted mainly of demonstration rotations and minor investigations into different fallow systems involving *Acioa*, Cashew, Pigeon pea, Elephant grass and natural bush.

(iii) *Colony :*

(a) *Agege Experimental Farm*.—Part of the new 300 acre acquisition was developed for the Poultry Sub-station, staff quarters, two unit farms and annual crop work on maize rust and manurial trials (both artificial and F.Y.M.). Botanical work on *Kola* yield recording commenced on the new farm, and the old farm is being laid down progressively to pasture for grazing trials as other activities are transferred to new sites.

(b) *Agege Dairy Farm and Gardens* are more fully dealt with elsewhere in this report.

(c) *Pota Native Administration Farm Centre* is situated on the coastal alluvium formation, a very poor soil type of limited extent and presenting special problems. At this farm centre a large range of new crops and varieties were tried and it is of interest to record that three Northern crops (*Bambarra*, *Groundnuts* and *Millet*) showed promise. Work was designed to develop suitable cropping systems for the coastal alluvium soil (which is relatively little farmed) using organic manure.

(d) *Badagry Seabeach Coconut Plantation*.—This 117 acre coconut plantation is the only sizeable one in Nigeria controlled by the Department and yield recording of palms, commenced in 1948, continued with a view to selection of seed trees. 1950-51 yields were very low—average 22.5 nuts per tree.

(iv) *Ijebu Province :*

Ijebu Native Administration Farm Centre was partially financed by Government. A new poultry unit and vegetable garden were installed and the piggery continued to provide local farmers with breeding stock.

(v) *Ondo Province :*

(a) *Akure Government Farm*.—Progress was made with the opening up of this new Farm which is to be designed partly on estate lines to investigate large scale permanent crop management and mechanised farming. Work on building was handicapped by shortage of materials but a start was made with this and also with provision of essential roads.

(b) Five Native Administration Farm Centres operated in Ondo Province mainly to demonstrate improved practices. Additional facilities included piggeries at Ado-Ekiti, Owo and Ikare ; poultry flocks at Ado-Ekiti, Owo and Ondo and small herds of shorthorn cattle at all four mentioned including some cows belonging to private owners. The fifth Farm Centre (Okitipupa) had no livestock section.

(vi) *Oyo Province*:

(a) *Moor Plantation, Ibadan*.—Moor Plantation continued to be the main research centre for the Western Region and various aspects of work undertaken there are given in appropriate sections of this report, and in the reports of the specialists. The main features of general interest during 1950-51 were the extension of contour strip farming throughout the Plantation and the more extensive use of tractor power. The latter has been most necessary of late due to keen competition for labour in the Ibadan area, while the former is new standard policy except for blocks on which detailed research programmes are in progress.

(b) *Fashola Stock Farm*.—Work at Fashola continued to be based on N'dama cattle, Poultry and Mechanised Farming each of which is dealt with in detail in the relevant sections of this report.

(c) Two small specialised ventures were run by Ibadan Native Administration with Departmental assistance—Ede piggery and Okuku poultry farm.

ANIMAL HUSBANDRY

CATTLE

4A. (i) *N'dama Multiplication Herd—Fashola*.—Severe dry season conditions late in the year led to some loss of condition in adult stock and probably contributed to the much heavier calf mortality rate, twenty-three animals being lost mainly from calf scour and impacted rumen compared with only six in the previous year.

A gross increase of fifty-two was recorded however, issues of breeding stock being on a larger scale than was possible in previous years as the following table shows:—

	<i>Bulls</i>	<i>Cows</i>	<i>Bull Calves and Young Bulls</i>	<i>Heifer Calves and Heifers</i>	<i>Total</i>	<i>Remarks</i>
Stock 31st March 1950	7	80	77	76	240	
Births	—	—	40	38	78	
Deaths	—	1	15	7	23	
Receipts	—	—	—	—	—	
Issues	12	1	3	5	21	<i>Bulls</i> : Ondo Province 6, Benue Province 2, Benin Province 5, Colony 1, M.P. 1. <i>Cows</i> : Asaba R.T.C. 6.
Transfers <i>within</i> herd	+ 21	+ 25	— 21	— 25	—	
Culling	2	—	1	—	3	
Stock 31st March 1951	14	103	77	77	271	Includes 5 bulls available for issue.

N.B.—The above figures differ slightly in grouping from last report.

Average birth weights of calves showed slight decrease over 1949-50 (bulls 38½ lbs and heifers 36 lbs compared with 40 lbs last year) and growth rate was also lower (1.3 lbs and 1.2 lbs per day respectively compared with 1.6 lbs). This was probably due to fall in dams milk yield with severe dry season. On the other hand a further slight improvement in days between calves was recorded from 400 to 396.

Disease.—No cases of Contagious Abortion occurred and, with the introduction of routine S 19 treatment, it was possible to regroup the herd with consequent saving of labour. Only one clinical case of trypanosomiasis resulting in death was recorded during the year although it was clear that many animals were infected. Routine blood smears were positive to tryps in 5.2 per cent of cases but in the one clinical case (a young calf) death was probably attributable to compacted rumen. No treatment for trypanosomiasis was given but routine inoculations against Anthrax, Black Quarter, Pleuropneumonia and Haemorrhagic Septicaemia were carried out.

Management.—Apart from regrouping of herds made possible by relaxation of contagious abortion precautions, no change in management occurred, the animals being run on semi-range conditions and kraaled at night. Concentrate feeding was confined to down calving cows and heifers which were fed a ration of cotton seed, guinea-corn and palm kernel meal at the rate of $\frac{3}{4}$ lb daily one month before and after calving. The limit of the natural stock carrying capacity of the ranch is now being approached and steps are being taken to improve this by making hay and silage, eradication of spear grass, reseeding and, if it is found necessary, manuring will be carried out. Very little culling or selection has been possible to date owing to lack of data and lack of numbers. Now that the breeding herd is reaching its full complement rigid culling and selection will be introduced based on standards of performance and size. It is hoped that further importations from French Guinea will be made in the coming year which will provide most valuable new blood for the foundation herd and speed up distribution considerably.

(ii) *Farm School Herds.*—Health of stock continued to be satisfactory although similar loss in condition to that recorded for Oyo Stock Farm occurred during the dry season. The farm tended to be rather overstocked at that time due to holding thirty beasts purchased for settlers. The policy of upgrading Borgu cattle to the N'dama continued and while the resulting crosses are turning out very uniform and satisfactory, there seems to be some diminution in growth rates and calf birth weights in the higher crosses. The Borgu is of course the larger animal and half breeds presumably exhibit hybrid vigour.

The policy of breeding draught bulls has been changed since cattle cultivation has never been popular and stock are now issued for the maintenance of fertility, thirty-nine being provided from the Farm School herd in addition to purchases.

(iii) *Moor Plantation Shorthorn (Muturu) herd.*—This herd is maintained for the production of work beasts and manure for the Plantation as well as provision of grade stock for Unit Farms and extension work, until such time as the supply of N'dama stock bulls from Fashola is sufficient to meet demand. The policy of grading up to N'dama bulls continued and the following birth weights and growth rates (lbs live weight) were recorded. These records cover the period 1942 to March 1951, figures in brackets being number of animals concerned.

<i>Breed of Animals</i>	<i>Birth</i>	<i>Weaning 7 months</i>	<i>12 months</i>	<i>18 months</i>	<i>24 months</i>	<i>30 months</i>	<i>36 months</i>
$\frac{1}{2}$ ND $\frac{1}{2}$ NS ..	27.1 (70)	116.9 (40)	159.4 (33)	244.2 (28)	316.6 (29)	379.3 (26)	414.2 (21)
$\frac{1}{2}$ ND $\frac{1}{2}$ GC ..	34.9 (22)	142.0 (11)	182.7 (14)	269.5 (13)	359.0 (12)	463.1 (9)	500.6 (6)
$\frac{3}{4}$ ND $\frac{1}{4}$ NS ..	31.3 (24)	144.7 (13)	176.5 (13)	258.8 (6)	317.2 (6)	392.2 (4)	454.7 (3)
$\frac{3}{4}$ ND $\frac{1}{4}$ GC ..	36.8 (7)	142.0 (6)	175.0 (3)	269.3 (3)	305.0 (3)	N.A. (1)	N.A. (1)

NOTES.—(1) N.A.—not available. The only heifer was accidentally served at the age of 23 months.
(2) Prior to 1947 weights of some animals are not available.

Health of stock was much improved (only seven deaths occurred) and feeding of silage brought the herd through the dry season without serious loss in condition.

(iv) *Badagry Seabeach Herd*.—In view of the marked success achieved in Dahomey by the use of Borgu cattle under the rather specialised seabeach coconut plantation conditions, it was decided to grade up the Badagry herd to this breed and a bull was obtained from Cotonu for the purpose.

(v) *Cattle Extension Work*.—Progress with cattle extension work has been slow and hampered by comparative shortage of bulls for distribution. Towards the end of the year however nine bulls were issued to herds in Benin Province, and the herd being built up on the new Akure Government Farm should make the supply position in Ondo Province more satisfactory in future. A small herd of six heifers and a bull has been loaned to the Rural Training Centre at Asaba for demonstration and training purposes and the progeny of this herd will be available for distribution in Benin and Warri Provinces. The slight decline in controlled herds in these two provinces (*i.e.*, from sixty-seven to sixty-four) will be offset by the opening of two new kraals now under construction.

On Demonstration Plots of maize adjacent to five kraals, F.Y.M. gave 63 per cent increase in yield, but interest in the use of manure is still lacking. The system of demonstration at kraal sites is to be extended and improved and it is hoped that continuous demonstration will eventually overcome local prejudice against manure.

DAIRIES

4B. (i) *Agege Dairy*.—The third financial year since the Dairy was transferred to Agege has emphasised the difficulties of maintaining a dairy herd under the adverse conditions of the Lagos area. Yields of milk and the revenue from milk sales for the year are somewhat lower than the previous financial year mainly due to a more severe attack of Trypanosomiasis than previously experienced. It is hoped that regular blood testing now being done by the Veterinary Department will enable any future outbreaks to be dealt with at an earlier stage. A further rise in labour wage rates also involved the Dairy in higher costs and, while this could doubtless have been borne partly by customers by increasing the price of milk, it was felt this was not in line with Government wages policy and the Dairy's own policy, which is to reduce the cost of milk by increasing efficiency and milk yield per cow.

Further improvement in labour organisation has been possible with the increased use of tractors but this has necessitated additional non-recurrent capital expenditure on stumping to permit mechanised cultivation. A hand operated winch has been found very useful for this work which is, of course, a long term investment.

In addition to the trypanosomiasis outbreak, in which fifteen animals were lost and which affected over one quarter of the herd at one time, there was a single mild outbreak of Foot and Mouth in which no animals were lost. Apart from these, health of stock has been reasonably good. Calf rearing presented some difficulty early in the year but improved with sulphaguamide treatment and the conversion of a small cattle house for calves. The main difficulty under which the Agege Dairy operates however is shortage of suitable cows. It has always been difficult to obtain reasonable milking animals and some of the young heifers coming into the herd (reared from dams purchased in Katsina Province) have given very poor performances. Grazing has been improved and with the present satisfactory production of silage, a much larger herd could be kept with relatively little extra cost apart from extra concentrate foodstuffs.

The accompanying table, while reflecting the seriousness of the 1950-51 Trypanosomiasis outbreak indicates that steady improvement has been made in regularity of calving and if we can obtain more lactations like the 1950-51 record (a heifer lactation of 5,062 $\frac{3}{4}$ lbs.—4,549 lbs in 305 days) prospects will be much brighter.

	Total No. of cows in herd	Average output of milk cows annum (lbs)	No. of full time lactations 305 days or more	Average milk yield in 305 days (lbs)	Range in milk yields (lbs)	Average lactation period (days)	Average percent- age B.F.	Average yield B.F. per month	Calving interval (days)	lb day between calves
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1948-49	57	1,700.9	12	1 893 $\frac{1}{2}$	103 $\frac{1}{2}$ — 4,582 $\frac{1}{2}$	294	—	—	415	5.1
1949-50	72	2,028.2	11	1,975 $\frac{1}{2}$	124 $\frac{1}{2}$ — 5,480	235	5.15	636.27	405	6.0
1950-51	76	1,617.0	13	1,806 $\frac{3}{4}$	62— 5,062 $\frac{3}{4}$	213	5.29	543.81	360	5.8

(ii) *Moor Plantation Dairy.*—Moor Plantation Dairy was re-organised during the year and careful analysis of costs and returns indicated that, at the existing price of milk it was unlikely to be economic even with increase in number of milking cows. Milk price has accordingly been raised to 7d per pint, at which figure it is probable that the unit could pay provided that, as in the case of Agege, more cows can be obtained. At present, overheads are as low as can be expected with the existing herd, but more animals could be accommodated and handled by the same labour force with a proportionate decrease in overhead costs.

Management continued to be on more intensive lines than at Agege in that stock are confined during the day and stall fed, being let out for exercise at night. Health of adult stock has been good and improved calf accommodation will overcome calf rearing difficulties.

Records for Moor Plantation Dairy submitted below, show quite satisfactory calving intervals and lactation periods.

Year	Total No. of cows in herd	Average output of milk per cow per annum (lbs)	No. of full time lactations (305 days or more)	Average milk yield in 305 days	Range in milk yield (lbs)	Average lactation period (days)	Average B.F. percent- age	Average yield of B.F. month	Calving interval (days)	lb per day milk between calves
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1950-51	20	1,536.36	2	2,000.78	269.25 3534.25	239.4	—	—	351	6.4

N.B.—Butter Fat recording has not yet been possible.

Notes on compilation of Dairy records for Agege and Moor Plantation :—

- (1) Calculated on cow days year, i.e., all cows dry or in milk allowing for entry into and exit from the adult herd.
- (2) Total milk yield for the year divided by number of cows in herd calculated as in (1) above.
- (3) i.e., the number of lactations of not less than 305 days.
- (4) Based on all lactations completed during each year, those over 305 were calculated up to 305 days and all below 305 days are included in the average.
- (5) All lactations completed during the year.
- (7) Total quantity butter fat multiplied by 100 divided by total quantity milk.
- (8) Average of weighted monthly figures.

PIGS

4c. A total of eleven Departmental and Native Administration piggeries were maintained during the year largely for the provision of breeding stock for extension work, but feeding and management trials were conducted at some of them. On the whole health and performance of stock were quite satisfactory and excellent growth rates were achieved in Agege piggery feeding trials (1.3 lbs average gain per day) though high food prices increased costs considerably. The position with regard to private piggeries showed no improvement and is still most unsatisfactory. At the close of the year there were thirty-six private piggeries inspected and assisted by the Department in the Western Region, six new ventures having opened up in the year and seventeen old ones having closed down as a result of financial losses. The general level of feeding and management continued to be very poor and it is clear that most pig-keepers lost money. Despite this however there is still keen interest in some areas and the better managed piggeries showed that reasonable profits could be made.

Issues of breeding stock to pig-keepers totalled seventeen boars and fifty-four sows and gilts, these being Large White grades mainly three-fourth to fifteen-sixteenth.

Further work at Moor Plantation indicated that the pure Large White and higher grades sows were able to raise litters satisfactorily if properly managed and growth rates of their progeny were much better than those of sows with more native blood. Policy has therefore been modified to one of concentrating on pure Large White, since it is evident from extension work results that pigs of any grade will only pay if adequately fed and housed.

Supplies of Feedingstuffs for Piggeries.—Stock food stores were operated by Ibadan and Oyo Native Administration and the former has been well patronised, supplying nearly six tons each of Palm Kernel Meal and Groundnut Cake to local pig-keepers. This venture is operated on a non profit making basis, approximately 5 per cent being added to landed costs to cover wastage in store and bags. The Oyo store did not justify its existence as there was only one functional piggery in the neighbourhood and it has therefore been closed. Elsewhere the Department assisted private pig-keepers in obtaining supplies of Palm Kernel Meal and Groundnut Cake though the latter was in short supply towards the end of the year.

Proposals to open similar stores are under consideration by Benin Province and Colony Native Administrations.

POULTRY

4d. The Department's work with Poultry was concentrated mainly at Fashola Stock Farm and Agege and continued to be based largely on hens of the R.I.R. breed. The effects of poor quality foundation stock imported when work was restarted after the war is still being felt, and it has also proved necessary to make careful selection from stock recently imported from the most highly recommended sources in the United Kingdom. There has not yet been time for this stock to contribute to the flocks to any appreciable extent.

(i) *Fashola Poultry Station.*—The main flock at Fashola had a disappointing year. Total egg production was 22,312 (equivalent to seventy-seven eggs per bird) but of this number, only 7,470 were incubated producing a total of 4,125 chicks (55.2 per cent of all eggs set). Hatching records represented a slight improvement on 1949 to 1950 (49.5 per cent) but total eggs incubated and output of chicks were low due to failure of

the "Secura" incubator early in the year and the fact that replacement birds came into lay rather later than expected with consequent lower egg production. Fertility, at 76.1 per cent of eggs set, was fairly good but dead in shell and dead germ figures were too high. Mid-year results (July to December) were better than other times of the year but it seems clear that the "Secura" incubator cannot be regarded as satisfactory, although high dead in shell may be associated with nutrition and this aspect is being investigated.

In addition to poor incubation results, high chick mortality occurred during the later half of 1950—this was due mainly to a serious outbreak of coccidiosis and no less than 1,031 chicks died under four weeks in this period, many more having to be culled. This disease was not brought under control by treatment despite efforts on the part of the Veterinary Department using Sulphaguamidine, Sulphamezathine, Sulphadiazine and Avisol and was only checked by improved management involving daily movement of runs and careful disinfection of equipment.

Towards the end of 1950 a Foundation Stock Breeding Centre Section was established. This section will be operated on similar lines to the new Foundation Stock Breeders grade of poultry farms in the United Kingdom which involves progeny testing and only eighty-three hens and pullets were considered good enough for this section, twenty-nine of them being pullets from the March 1950 importation of day-old chicks from Cheshire. Four cocks for this section were imported as adults from Kent in November. Stock statistics for the Fashola flocks are set out below:—

	<i>Hens</i>	<i>Cocks</i>	<i>Young Stock</i>	<i>Chicks</i>	<i>Total</i>
On hand at 1st April, 1950	480	287	312	481	1,560
Additions by importations	—	4	—	—	4
Number hatched during year	—	—	—	4,125	4,125
Number issued for breeding	154	216	343	70	783
Number culled (destroyed or sold for table)	111	88	63	194	456
Number died	103	35	81	1,695	1,914
Number missing	4	—	8	19	31
On hand at 27th March, 1951	179	37	450	1,939	2,505

With the improvement in foundation stock, chick management and the organisation of the F.S.B.C., considerable improvement in the growing stock is already apparent. Performance data of the new generation is not, of course, yet available and the test of the new organisation should come in the next twelve to eighteen months.

(ii) *Agege Sub-Station*.—Designed as a reserve flock to cover the risk of serious losses at Fashola, Agege sub-station is organised on similar lines on a smaller scale. Total egg production of 14,731 (including pullets eggs which were not incubated) was quite satisfactory—equivalent to 177 eggs per bird—but rather a high proportion of mis-shapen eggs was recorded. This factor combined with limited incubator capacity at peak periods and a suspected outbreak of *Salmonella pullorum* (which involved four months quarantine during which no eggs could be set) accounted for the low number of eggs set—1,880 plus 981 sold for hatching. Incubation results were similar to Fashola (54.3 per cent hatch of all eggs set) but issues of breeding stocks were rather better, over 200 birds being issued in the Colony and Abeokuta Province. Hatching eggs have always been in demand in the Colony area and a recent innovation is the sale of 152 day-old chicks.

(iii) *General Distribution of Poultry—Western Region.*—The following issues of breeding stock were made mainly to farmers :—

Province	Cocks	Hens and Pullets	Young Stock	Day-old Chicks	Hatching Eggs
Abeokuta	17	124	—	—	459
Benin	17	49	43	—	190
Colony	131	163	30	152	981
Ijebu	27	30	—	—	446
Ondo	4	8	15	—	333
Oyo	44	—	—	—	—
Warri	14	26	19	—	11
Total	254	400	107	152	2,420

(iv) *Other Poultry Centres.*—Poultry were kept at most other Government farms and Native Administration Farm Centres for local distribution. The majority of them drew largely on Fashola for supplies and were, in fact, mainly distribution centres for Fashola reared birds. In Oyo Province, the Okuku Native Administration Poultry Farm concentrated on a cross bred policy (thirty-six native hens with R.I.R. cocks) to investigate the economics of a small scale venture and provide stock for local sale. In Benin Province, Ogba Government Farm and Irrua, Auchi and Sabongida Native Administration Farm Centres maintained small flocks which contributed to the general distribution programme.

(v) *Village Poultry Improvement Schemes.*—With a view to obtaining maximum results from distributed R.I.R. poultry, it was decided towards the end of 1949-50 to concentrate efforts in the Colony on the small village of Akowonjo near Agege. The people co-operated whole-heartedly by disposing of all native cocks, providing simple housing and feeding the R.I.R. cocks sold to them, and at the end of one year's work, young stock were approximately 40 per cent heavier than the former birds and worth nearly 70 per cent more in the local market. The success of Akowonjo (which won both first prizes for cross bred poultry at the Colony Show) has encouraged other neighbouring villages to apply for similar assistance, and the success achieved with poultry has enabled the Department to introduce other improvements into the village economy such as palm oil machinery and composting.

FODDER AND PASTURES

5. (1) *Grass Work.*—Further experiments with Elephant grass at Moor Plantation indicated that the most economical system of management is bi-monthly cutting in the rains and three monthly cutting in the dry season. Yields from this system for the past three years were as follows (lbs edible grass/acre) :—

	1948-49	1949-50	1950-51
With 1 ton F.Y.M./acre/annum	47,700	47,440	39,280
With 4 tons F.Y.M./acre/annum	58,610	62,940	50,850

None of the fodder canes came up to the performance of Elephant grass and comparative figures from yield trials are given below in lbs edible material per acre.

<i>Variety</i>					<i>1 Ton/Acre F.Y.M.</i>	<i>4 Tons/Acre F.Y.M.</i>	<i>10 Tons/Acre F.Y.M.</i>
Fodder Cane	1	..	..	..	28,768	31,127	—
"	2	..	..	..	39,962	39,711	—
"	3	..	..	..	38,338	51,001	—
"	4	..	..	..	33,756	47,889	—
"	5	..	..	..	39,537	29,754	—
"	6	..	..	..	34,819	40,155	—
"	7	..	..	..	32,035	33,021	—
"	8	..	..	..	34,317	38,203	—
"	9	..	..	..	44,235	33,466	—
"	10	..	..	..	40,020	51,021	—
Guinea Grass	..	..	..	..	31,049	28,613	—
Elephant Grass	..	..	..	..	44,989	54,481	78,068

(2) *Silage*.—Further experience with silage has led to the incorporation of this valuable dry season supplementary feed into the programme of most Departmental Farms and Native Administration Farm Centres. Pit silos have been found very satisfactory and results from Moor Plantation and Agege are summarised below :

					<i>Moor Plantation</i>	<i>Agege Dairy</i>
Weight of fresh material	..	..	..	..	41.01 tons	101 tons approx.
Weight of good silage	..	..	..	..	25.74 tons	81 tons approx.
Percentage of good silage	..	..	..	..	62.7 per cent	80.2 per cent

All made from Elephant grass which was put in to silos unwilted with consequent high loss of moisture. Spoilage was not serious.

(3) *Grazing Trials—Agege*.—The old farm at Agege is gradually being changed over to pasture as the new extension develops and takes over annual crop experiments. The most successful grazing grasses have been Guinea grass, which is the local dominant species, and molasses grass and records of grazing trials were as follows :—

<i>Grass Type</i>					<i>Stock carrying capacity acres per cow per annum</i>
Guinea grass	..	..	..	..	5
Molasses grass	..	..	..	..	5.3
Gamba plus Centrosema	..	..	..	..	5.3
Mixture of Ladikoro plus Makarikari plus Guinea grass	..	..	..	..	3.4
Guinea grass plus Sour grass	..	..	..	..	7.7

These figures are somewhat higher than usual as a result of poorly distributed rainfall.

On the Dairy Farm—grazing requirements of twenty-four beasts have been completely supplied by fifteen acres of Guinea grass, about three acres of which is very poor.

COMPOST

6. With the co-operation of the Health Authorities, an intensive composting programme was started in the Colony towards the end of 1950. Agricultural Department staff trained Sanitary labourers in this work for which town refuse was used and large number of compost heaps were prepared at Agege and Badagry. It is hoped that the onion growers of Badagry will eventually take up supplies of compost and the Agege production will be absorbed initially by the Ikeja Mechanical Cultivation Unit.

Akowonjo Village.—Composting formed an important part of the concentrated village improvement work at Akowonjo Ikeja Division mentioned in connection with poultry and palm oil processing. Farmers co-operated very fully with the Departmental compost demonstration team, and no less than fifty of them produced compost heaps for use in the 1951 season which is a remarkable tribute to their confidence in the Agricultural Department.

Elsewhere compost was made at Government Farms, Native Administration Farm Centres and also at most nurseries where it was used on citrus and palm seedlings.

EXPERIMENTAL UNIT FARMS

7. (1) *Moor Plantation.*—For details of the design and operation of Moor Plantation Unit Farms reference may be made to the 1949-50 Annual Report in which they were fully described. One of them (number 4—Poultry and Vegetable) was discontinued early in the year and another (No. 3—hand-worked with citrus) had to be closed at the end of 1950 due to its extremely poor condition and continuance of water logging. One new farm (No. 5—Citrus and Coconut with sheep and poultry) was opened and operated by direct labour in order to establish the necessary permanent crops. Its final layout will be :—

Arable (seven-course rotation)	..	..	..	..	..	3.50 acres
House and stock pens	..	..	..	..	..	.50 „
Cassia and Teak	..	..	..	..	..	1.59 „
Permanent crops	..	..	..	..	..	5.70 „
Centrosema pasture	..	..	..	..	..	2.30 „
Total	..	..	..	..	..	<u>13.59 acres</u>

Minor adjustment in personnel occurred—thus the replacement of an unsatisfactory tenant in Unit Farm No. 2 is reflected in considerable improvement in this holding—and apart from No. 7 all the holdings had a satisfactory year as may be seen from the accompanying statistics. Unit Farm No. 7 required fairly heavy investment in establishment of new fodder blocks which cut down gross profit and the tenant, who is not very satisfactory, was ill for part of the year. Again this type of holding is somewhat liable to fluctuation of income as it depends largely on sale of fat cattle.

A study of the history of these farms brings out most clearly the important influence exerted by the quality of the tenant on the results obtained. These units are designed to test the results of our experimental work, and to incorporate them into systems which will operate satisfactorily in the hands of the peasant farmer. They form, therefore, a most important and fundamental section of our work and the importance of a satisfactory tenant is obvious. It is unfortunate that satisfactory tenants are so difficult to find.

Record of profit : Moor Plantation Unit Farms.—(N.B. 1950-51 is the first to be recorded on a financial year basis.)

			U.F.1	U.F.2	U.F.6	U.F.7	U.F.8
			Cattle Cultivation	Hand cultivated Arable	Coconut and Cattle Fattening	Cattle Fattening	Pigs and Fruit
			£ s d	£ s d	£ s d	£ s d	£ s d
1947	..	..	18 7 11	23 8 11	62 9 10	0 14 7	6 19 2
1948	..	..	24 1 2	30 16 10	70 11 1	20 11 10	44 0 1
1949	..	..	57 14 10	14 9 1	89 12 2	80 6 1	177 0 9
1950-51	..	..	71 0 9½	48 4 0½	135 3 1	47 18 4	176 5 3

N.B.—These figures represent nett cash incomes derived from the farms plus appreciation in value of stock and plant.

(ii) *Agege Unit Farms.*—On Agege Experimental Farm, two Unit Farms were being developed at the close of the year; buildings were almost completed and annual crops planted by direct labour. One of these farms is designed to study the economics of fattening weaner pigs based largely on purchased foodstuffs, with small reserve acreages of maize and cassava to guard against excessive market prices. The other will be run on local farming practices incorporating known improvements, such as compost and better small stock management. Establishment of a fruit and poultry unit farm (also based largely on purchased foodstuffs) was delayed due to quarantine measures in Agege poultry flock.

FARM SCHOOLS

8. The two Oyo Province Farm Schools (Oyo and Ogbomosho) continued to operate during the year but due to disappointing results in the past, it was decided to change the recruitment policy. Formerly this involved taking on youths of approximately eighteen years for a two-year course; the 1950 classes were recruited from a much younger age group (thirteen years approximately) and were illiterates, the Farm Schools aiming at giving them a minimum formal education as part of their four-year training. This policy seems to have been sound in that, of the forty-eight recruits (twenty-four at each Farm School) only six from Ogbomosho have left and it is proposed to recruit every second year in future rather than every year. A further point in favour of the younger age groups has been the greater possibility of interesting them in cattle, which is most important and was always a difficulty with the older boys. Each pupil has his own calf to look after and many of the boys show great keenness as a result. The general policy of the two farms was formerly more or less identical but, in view of recent developments in mechanised agriculture, it has been decided that both Farm School programmes will be modified to some extent, Ogbomosho being based mainly on tractor cultivation with the use of artificials to supplement F.Y.M. and green manures. Another modification, applicable to both Farm Schools is the proposal to settle pupils at the end of their training in groups instead of the former system of returning to their individual farms and villages. It is hoped that this will overcome the difficulties encountered by most pupils on their return to their homes, where they have been unable to carry out their improved methods due to local prejudice and ridicule. Land for a settlement for Ogbomosho School has been found, but land for Oyo School settlement is proving difficult to obtain.

OIL PALMS

(i) *Nursery Work*.—A total of thirty-eight Departmental and Native Administration nurseries were maintained in the Western Region and Colony during the year from which 30,664 improved type palm seedlings were distributed to farmers. Demand in Benin continued to be high and palm seedlings sufficient for 284 acres were issued in that Province alone, supplemented by planting of wild seedlings estimated at a further 158 acres. Latest estimates indicate that approximately 24,500 acres of planted palms exist in Benin Province. Elsewhere demand was not so great though supplies of seedlings were short in Ondo and Oyo Provinces and germinator and nursery facilities have been expanded to meet these extra requirements.

(ii) *Palm Oil Presses*.—With improved supplies of palm oil presses, demand was soon satisfied but it is quite apparent that more presses could be absorbed. The chief opposition comes from women who see their livelihood threatened as they normally provide the labour for oil making, being allowed to keep the nuts in payment. As mentioned in last year's report however, the full palm oil potential of the Western Region is never exploited, fruit being allowed to fall from the palms, and the introduction of presses would enable an appreciably greater production to be achieved. In recent months press work in the Colony has therefore been concentrated in a few selected villages with the object of establishing the press firmly in the economic life of the people. Presses complete with operators have been set up to work for hire on an economic basis (after a short period of free demonstration) and this system shows signs of being more successful than the former method of itinerant demonstrations which aroused only passing interest.

(iii) *Nut-crackers* are more immediately popular, probably because there are ample supplies of fallen nuts which can be gleaned. Deliveries of machines have been slow but they are now coming forward—both power-driven and hand-operated machines, the latter being of improved types compared with pre-war models. In the Colony a similar system of demonstration to that used with presses has been operated with nut-crackers and a combination of the two machines has proved very popular.

(iv) *Pioneer Oil Mills*.—The introduction of pioneer mills into the Western Region has not been so easy as in the East due to less suitable indigenous economic systems, and it is hoped that palm press work may develop more satisfactory conditions. Surveys conducted by the Department established the existence of adequate palm fruit supplies, and large scale nurseries of improved palm seedlings are being established in the Benin-Warri area adjacent to selected mill sites to provide for future demands which the mills are expected to create.

(v) *Production of Palm Oil and Kernels*.—The total tonnage of palm oil and palm kernels graded in the Western Region and Colony as compared with 1949-50 is shown in the following table. Prices paid for palm oil on the internal market were higher than last year and probably accounted for the drop in export purchases. Higher kernel prices appear to have stimulated production, probably from fallen nuts.

		1949-50		1950-51		Increase (+) or Decrease (-)	
		<i>Palm Oil tons</i>	<i>Palm Kernels tons</i>	<i>Palm Oil tons</i>	<i>Palm Kernels tons</i>	<i>Palm Oil tons</i>	<i>Palm Kernels tons</i>
Western Provinces		26,308	154,779	24,039	166,592	- 2,269	+ 11,813
Colony		1,245	16,589	1,290	26,746	+ 45	+ 10,157
Total		27,553	171,368	25,329	193,338	- 2,224	+ 21,970

COCOA

10. A full report on cocoa work, now under the control of Deputy Director (Cocoa), will be submitted by his section. Provincial staff co-operated with the Cocoa Section in continuing the quality improvement campaign which resulted in a further marked rise in the standard of cocoa purchased. Small numbers of cocoa seedlings were distributed by provincial staff in Ondo and Benin Provinces.

FRUIT

11. (i) *Nursery Work*.—In addition to maintaining supplies of improved oil palm seedlings most of the larger Departmental and Native Administration nurseries produced supplies of budded citrus and other economic trees for sale. The following table gives details of distribution made from these nurseries.

Province	Nur- series	Budded Citrus				Budded Man- go	Avo- cado	Kola	Coconut	Coffee	Oil Palms	Seedling Citrus and minor fruit trees
		Sweet Oranges	Tangerine types	Grape fruit	Lemon							
Abeokuta	7	989	260	116	163	—	—	—	—	65	463	—
Benin	5	772	188	202	39	84	24	118	—	2	17,069	406
Ijebu	1	317	10	43	15	—	—	—	—	—	498	—
Ondo	9	1,281	147	91	57	39	41	24	47	862	534	66
Oyo	8	1,960	459	460	146	86	119	226	1,268	—	10,990	1,077
Warri	5	134	3	20	—	—	2	21	—	—	1,110	—
Colony	3	624	165	382	429	—	50	—	2,438	49	—	871
Total	38	6,077	1,232	1,314	849	209	236	389	3,753	978	30,664	2,520

(ii) *Fruit Products*.—The Agege Farmers Co-operative Society and Blaize Memorial Institute, Abeokuta, again had successful seasons; the former produced 79,049 bottles of squash in the year compared with 80,187 bottles last year while the latter produced 194,665 bottles as compared with 184,237 in 1949-50.

(iii) *Utilisation of Surplus Grapefruit*.—Supplies in Agege area were not excessive and small surpluses were disposed of through the Department in Northern Provinces. The Ibadan area on the other hand has larger surpluses and arrangements are in hand by Department of Commerce and Industries to absorb part of these in a canning factory.

MECHANISATION

12. (a) *Fashola Agricultural Engineering Section*.—Further progress was made with the development of Fashola Agricultural Engineering Section mentioned in last year's report. Three Staff quarters and two labour lines were erected to house increased staff, and the workshops and implement sheds extended to accommodate extra equipment.

The road system, so necessary for large scale farming, was extended and a Massey-Harris Tractor and one way disc were found very useful for this work.

Testing of mechanical equipment continues to be a major function of this section and it is hoped that the basic unitary equipment for most operations will have been determined by the end of 1951. It will, of course, remain a function of the section to test, and where necessary design, equipment likely to be of value in the Region.

This aspect of work at Fashola is, of course continuous, and results to date have enabled the Department to advise on suitable equipment for Western Region Production Board Schemes in Ondo and Oyo Provinces. Another continuous feature of the Fashola Station is tractor driver instruction. Six men were trained during the year of whom four were now working on the station and a new course of eight trainees started towards the end of the year.

(b) *Fashola Mechanised Unit Farm.*—Substantial progress was made with the development of a large scale Mechanised Farm on the Fashola estate. The farm varies from practically flat land to slopes of 7 and 8 per cent and the layout has been based on strip cropping at vertical intervals varying from three-foot to six-foot, the higher parts being left for future teak plantations.

Clearing costs were very low (approximately £2 10s per acre) as the land is not heavily timbered, and while stumping with the Treheller monkey winch proved very satisfactory, roots and boles of larger trees were more troublesome and required the use of tractor power.

It was established quite early that disc ploughs and Crawler tractors were needed for the heavy work of breaking new land and of the 482 acres cleared in 1950-51, 292 acres were broken. Freshly broken land proved too rough for good cultivation and a second cultivation was required using a one way disc. Heavy disc harrows would have been useful had they been available.

Ridging equipment had to be adapted before it would do a good job at both making and splitting ridges, and mechanical planting could not be tried as equipment arrived too late. However both yam and cassava planting will need further study before they can be mechanised.

In the 1950 season there was time to plant only twenty-two acres of maize and nine acres of guinea-corn—the latter gave a fair yield (727 lbs acre) but the former was a failure in common with much of the Oyo Province crop.

(c) *Mechanisation of Government Farms.*—With rising costs and shortage of labour, Mechanisation of Government Farms has proceeded rapidly. Moor Plantation, Ibadan used a Ferguson with considerable success throughout the year and was provided with a Fordson wheeled tractor later on which greatly facilitated early preparation of land for 1951 cropping.

Agege Dairy is now very fully mechanised as regards its annual cropping, having both Ferguson and Fordson wheeled tractors, and a Fordson wheeled tractor was secured for Akure Government Farm in March 1950. Experience to date indicates that the Ferguson can handle most light land work when initial breaking has been thorough.

(d) *Mechanised Group Farming Schemes :* (i) *Ikeja Mechanical Cultivation Unit.*—In September 1950 a small pilot tractor unit of approximately sixty acres was started on the Building Free Zone of Ikeja airport with a view to exploring the possibilities of tractor power in overcoming the acute shortage of farm labour which is characteristic

of Lagos area. The Scheme is designed on tenant farming lines, Ikeja Native Administration acting as land-lord and undertaking all cultivation operations, (excluding planting, weeding and harvesting of crops which are tenants' responsibility). In return, the tenants pay a slightly enhanced rent to allow for the cost of preparing land for tractor cultivation, and the full cost of all operations directly associated with the crops planted.

The unit is organised on a four course rotation, laid out in a similar way to the old English manorial field system—four long narrow fields with division between the tenants' holdings running across them. Holdings will be six acres each and nine tenants were taken into the Scheme in the first half year (many more applied). One course was opened to late maize and late cassava in October 1950, and the remaining three courses are now nearing completion in readiness for the early rains of 1951 season.

Clearing and removal of stumps from the unit was done on contract and proved a long and difficult job as there were numerous old kola trees, walls and burrow pits in the area. The Ferguson tractor and two furrow disc plough gave an excellent performance despite minor troubles due to conditions being really too severe for such light equipment. If the unit is extended, it will be necessary to have another tractor and something heavier than the Ferguson will be desirable for initial land breaking work.

(ii) *Ondo Province Group Farming Schemes.*—Plans have been prepared for two group farming schemes financed by Western Regional Production Board at Irele in Northern Ekiti and Ikeram in Owo Division. These Schemes, for which equipment has been ordered, will be based on grouping of individual holdings adjacent to one another and while individual farmers will have to follow agreed rotational and farming systems, they will retain their own holdings and be responsible for all minor operations, planting, harvesting and disposal of crops.

(iii) *Oyo Province Group Farming Schemes.*—One group farming scheme was being started at Iwo in Oyo Province; survey was completed and clearing in progress. Two other areas near Fashola were also being investigated.

FERTILISERS

13. As a result of better prospects of obtaining fertilisers and the urgent need to increase food production, a series of artificial fertiliser trials has been laid down on Departmental farms, Native Administrations Farm Centres and private land in the Western Region and Colony. These trials, which involve yams, maize, cassava, rice and minor intercrops are based on rotations and full results will not be available for between two and three years, but it is hoped that preliminary results in 1951 may enable the Department to plan for future development of fertiliser work in the Western Region.

NIGERIAN BIRDSEYE CHILLIES

14. The 1949 crop was very small, only three tons being graded, and as a result very high prices were paid. This led to large scale planting in 1950, probably the biggest crop yet harvested in Oyo Province, and though buying opened at £145 per ton, the total crop was far greater than buyers wanted and price fell later to £120 per ton. In all, sixty-five tons were bought, probably about one-quarter of the total crop, and all was Grade III quality, colour being particularly poor this season. The widely fluctuating price and uncertain demand for this crop make it rather unsuitable for local farmers and, while seed supplies are being maintained, no active encouragement is now being given.

RICE

15. (a) *Extension Work*.—Attacks of army worm on rice were widespread and it was feared that these (combined with poor early rains in some areas) might affect the rice crop seriously. However final yields were good and the high price of rice was probably due to maize failure rather than shortage of rice itself. Upland rice farming increased in Ondo Province and also in southern Abeokuta, where greatly increased acreages have already been planted for the 1951 crop.

Interest in swamp rice cultivation in the coastal lagoon area is still slight despite continued demonstrations by the Department and it seems unlikely that expansion will occur in this area without some capital investment in heavy clearing.

A promising development is the tractor cultivation of swamp land in northern Oyo Province which, while still in the experimental stage, has aroused considerable interest among local farmers.

(b) *Rice Mills*.—Six Departmental and eleven privately owned rice mills operated during the 1950-51 season, most of them being very well patronised, and three new Departmental mills were in course of erection at the end of the year. Apart from the Ondo and Wasimi mills, sold to a private purchaser and a Co-operative Society respectively, transfer of all other mills to Department of Commerce and Industries was arranged to take place as from 1st April, 1951.

Fuel consumption figures were rather variable as can be seen from the accompanying statistics, and general experience was that a milling charge of 3d per lb (paddy) covered working costs very satisfactorily provided a turn over of 150 to 200 tons paddy per year could be assured.

RICE MILL STATISTICS—WESTERN REGION 1ST APRIL, 1950—31ST MARCH, 1951

Station	Total Paddy Milled lbs	Total Clean Rice Produced lbs	Per- centage Clean Rice to Paddy	Mill Running Hours	Production per hour		Diesel Oil used	
					Paddy lbs	Rice lbs	Gallons used	Gallons per cwt Paddy milled
Wasimi*	389,221	275,547	70.79	1,108.20	351.22	248.64	433.5	.12
Owode	285,862	198,659	69.49	744.84	383.79	266.71	248.00	.10
Ekpoma	151,460	112,257	74.11	623.64	242.86	180.00	253.62	.19
Ughelli	375,472	261,680	69.69	1,327.87	282.76	197.07	364.00	.11
Ondo†	114,345	80,499	70.40	728.20	157.02	110.54	385.00	.38
Ikole (July 1950 to March 1951)	140,130	103,263	73.69	612.90	228.63	168.48	212.00	.17

* Mill sold to Co-operative Society on 31st March, 1951.

† Mill sold to Private Buyer on 5th March, 1951.

Station	Milling Charge	Total Revenue	Total Expenditure	Loss (Gross)	Profit (Gross)
		£ s d	£ s d	£ s d	£ s d
Wasimi	3/8 lb/paddy	649 13 4	418 8 1	—	231 5 3
Owode	3/8 lb/paddy	595 12 11	317 19 9	—	277 13 2
Ekpoma	3/8 lb/paddy (approx.)	203 4 11	265 13 7	62 8 8	—
Ughelli	1/2 lb/paddy	292 14 1	298 3 6	5 9 5	—
Ondo	3/8 lb/paddy	179 11 6	257 2 1	77 10 7	—
Ikole	3/8 lb/paddy	234 1 0	216 3 0	—	17 18 0

COTTON

16. With higher prices being paid in 1950 over 580 tons of Ishan seed-cotton were purchased at Oshogbo. Quality was very poor, adulteration with native cotton was common and no samples reached Grades I and II. It is clear that much of this cotton had been held over from 1949 and the higher price, while stimulating sales, did not have the same effect on cotton cultivation. The 1950 rains were delayed and, as a result of this and the better prospects for food crop farming, an appreciable amount of Meko grown seed was not taken up by farmers. In order to cover expected seed shortage in 1951, a bonus was paid to farmers in the Oshogbo area who were willing to have their farms rogued. This system was not particularly successful and with the poor 1950 Crop at Meko, where less than one ton seed-cotton was bought, seed supplies for 1951 are likely to be short.

TOBACCO

17. In Oyo Province, the main producing area, Native Administration legislation enforcing a close season for tobacco appears to have given good results as damage from stem borer and leaf curl were less than in previous years.

Results of the manurial experiment at Ago-Are will be given by Chemistry Section.

Samples from northern Ondo Province submitted to Messrs B.A.T. Company received favourable reports.

COFFEE

18. With high world prices, interest in coffee cultivation suddenly revived and supplies of seedlings for planting were far short of demand. This sudden demand could not be foreseen but seedlings have been established for 1951 season.

TETRACARPIDIUM CONOPHORUM

19. From further trials with this new crop it appears that heavy shade conditions may not be essential which is somewhat surprising as it is found naturally in forest conditions. At Ijebu Ode unshaded plants gave approximately twice as heavy yields as plants growing under medium and heavy shade, and the plants were much more accessible and easy to harvest.

Over 3,000 seeds were supplied to the Ijebu Farming Project nurseries.

HEVEA RUBBER

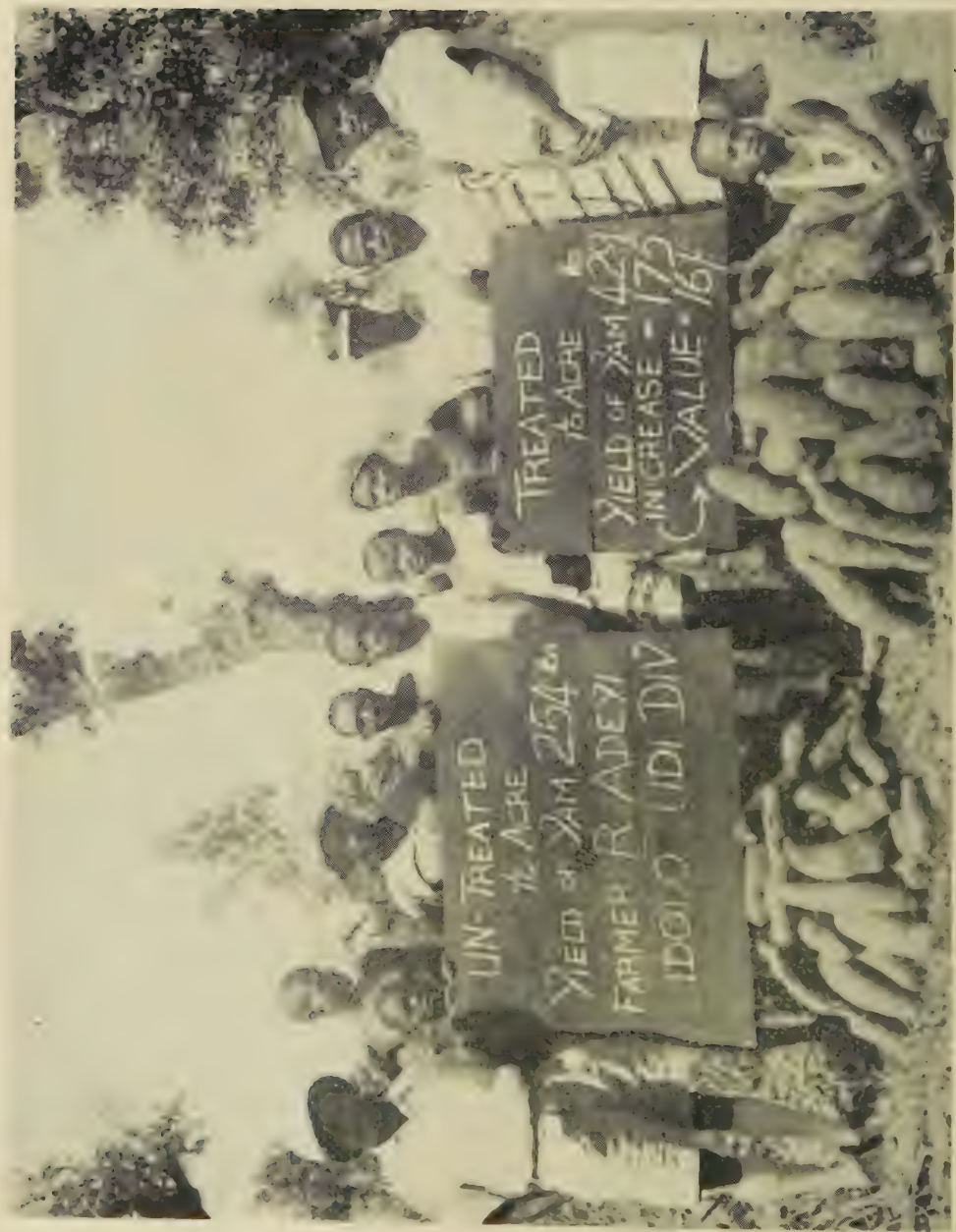
20. With heavy overseas demands the price of rubber rose rapidly to 3s 6d per lb. Interest in rubber tapping revived and boom conditions prevailed in the Benin Province causing quite serious shortage of farm labour. Planting of rubber is reported to have begun again in parts of Warri and Benin Provinces and production of all grades totalled 11,140 tons compared with 4,184 tons in 1949-50.

VEGETABLES AND ORNAMENTAL GARDEN WORK

21. Small scale vegetable gardens were maintained at Moor Plantation, Abeokuta, Benin and Agege for training, demonstration and experimental purposes and, apart from seed shortage of some varieties, quite reasonable results were obtained. The Badagry Native Administration garden continued to investigate production and marketing of European type vegetables based on the indigenous onion growing technique, and it appears likely that some types can be successfully interplanted provided the marketing difficulty can be overcome.



SHIKA STOCK BULL WHITE FULANI



ARTIFICIAL FERTILIZER DEMONSTRATION: HARVEST TIME AT IDODO, UDI DIVISION, ONITSHA PROVINCE



YAM HILLS : ABAKALIKI



DAUDAWA CATTLE SHOW



SAMARU 1949. GROUNDNUTS VARIETY CASTLE CARY : MARKED ACCELERATION OF VEGETATIVE GROWTH DUE TO PHOSPHATE.



SAMARU 1949. GROUNDNUTS (VAR : CASTLE CARY) AT HARVEST. RELATIVE EFFECT OF DUSTY LIME AND GYPSUM IN PRESENCE OF SUPERPHOSPHATE
 O = NO MANURE.
 T = TRIPLE SUPERPHOSPHATE AT 24 LB PER ACRE APPLIED TO SEEDLING 10 DAYS AFTER PLANTING.
 TGF = GYPSUM (G) DUSTED AT 50 DAYS FROM PLANTING AT 100 LB PER ACRE ON FOLIAGE (F) OF GROUNDNUTS RECEIVING TRIPLE SUPERPHOSPHATE.
 TLF = FRESHLY SLATED LIME (L) CONTAINING AN EQUIVALENT WEIGHT OF CALCIUM (43 LB PER ACRE) DUSTED AT 50 DAYS FROM PLANTING ON FOLIAGE OF GROUND NUTS RECEIVING TRIPLE SUPERPHOSPHATE (T).

Further progress was made with the collection of ornamentals being established at Agege and this section proved an increasingly popular amenity for the Lagos area. Contact was maintained with Accra and Porto Novo Botanical gardens from which additional species were secured for the collection. Moor Plantation also provided supplies of ornamental plants for Ibadan area.

DEVELOPMENT LOANS

22. Advice was given on the numerous applications for agricultural loans received by the Western Region and Colony Development Boards. It was evident that most of the applicants had little or no knowledge of the project concerned and in many cases they were unable to provide adequate or skilled supervision. Departmental staff gave as much advice and supervision as possible to approved projects, but in several cases the ventures were not as successful as they could have been.

The Department has also been in close touch with the projects of the Regional Production Development Board and the Engineering Branch is being considerably enlarged for the servicing of the Board's equipment as well as that of projects sponsored by the Department. The development of the advisory side of the Department's activities and the ever increasing demand made on these services, is putting an added strain on the provincial staff and made the lack of officers of experience most keenly felt.

CROP AND LAND SURVEYS

23. Apart from the usual monthly intelligence service maintained by the Department in the form of Crop and Weather reports and market statistics, Departmental staff co-operated in the collection of yield data for the 1950 Agricultural Census. Great difficulty was encountered in many areas in obtaining the co-operation of farmers in this work, and it will probably be necessary to draw largely on data from Government farms and Native Administration Farm Centres. Surveys were conducted in preparation for the establishment of further Pioneer Oil Mills in Benin and Warri Provinces and also for a group farming scheme in Ondo Province and for the proposed mechanised farming scheme in the Upper Ogun valley, Oyo Province.

PRACTICAL TRAINING COURSES IN AGRICULTURE

24. In response to demand for training in Agriculture, largely associated with Development loan projects, sixty private persons were given short courses at Government and Native Administration farms. These courses were mainly concerned with specialised lines of work, poultry and piggery training being most popular, and were essentially practical in nature.

AGRICULTURAL SHOWS

25. (i) *Colony Agricultural Show*.—The Fourth Colony Agricultural show was held at Agege in November 1950 and, apart from the larger types of livestock, the quantity and quality of exhibits was very satisfactory. In addition to the Agricultural Department, a number of other Government Departments and Lagos Commercial firms staged demonstrations and the firms contributed generously to the prize fund. Approximately 1,000 exhibitors took part and two cups were awarded in addition to 1st and 2nd prizes in the forty-nine classes.

(ii) *Ijebu-Ode Show*.—The first show to be held in Ijebu Province was staged in November 1950 and while exhibits were not of very high standard, keen interest was aroused by demonstrations made by the Department. Particular interest was shown in demonstrations by Moor Plantation tractor unit and the Cocoa Section and it is hoped that in future shows the exhibits side will be more strongly developed.

(iii) *Oyo Agricultural and Handicrafts Exhibition.*—The Oyo exhibition was revived after a two years' lapse and while exhibits were not very prominent, demonstrations of improved livestock and crops and of mechanical equipment were popular.

(iv) *Fashola Stock Farm.*—Nine demonstrations of tractors and implements were given by the Agricultural Engineering Section during the year. Visitors present at these included members of the Western Region Finance Committee, Western Region Production Board, The Alafin of Oyo, Regional Deputy Directors of Agriculture Assistant Directors of Veterinary Services and Diploma Students from Yaba Technical Institute. The Engineering Section staged a demonstration at the Oyo Exhibition mentioned above.

(v) *Moor Plantation Farmers' Week.*—This annual event was held in August and 761 farmers took part in organised tours covering all sections of the Department's activities.

APPENDIX I

1950 MONTHLY RAINFALL RECORDS

ONDO PROVINCE

Month	Akure ins.	Ondo ins.	Ado-Ekiti ins.	Owo ins.	Okitipupa ins.
January	0.26 (3)	0.45 (2)	0.71 (2)	0.43 (1)	0.55 (1)
February	0.07 (1)	0.27 (2)	—	0.14 (1)	—
March	4.22 (5)	1.75 (5)	0.62 (3)	2.41 (3)	4.25 (6)
April	8.24 (11)	8.31 (11)	4.12 (10)	6.58 (7)	8.16 (7)
May	7.67 (11)	6.98 (13)	8.90 (8)	9.48 (9)	12.25 (8)
June	6.42 (8)	8.11 (18)	5.47 (10)	5.80 (10)	18.01 (13)
July	10.73 (15)	11.45 (22)	7.99 (10)	7.06 (12)	19.58 (13)
August	1.03 (5)	1.45 (15)	1.28 (3)	1.80 (4)	—
September	6.07 (15)	6.01 (23)	6.77 (12)	6.91 (9)	5.21 (8)
October	6.71 (14)	7.47 (20)	7.26 (20)	7.07 (10)	9.10 (9)
November	1.32 (4)	1.68 (7)	2.64 (5)	2.10 (3)	3.77 (3)
December	0.89 (2)	0.55 (2)	1.40 (2)	—	—
Total	53.63 (94)	54.48 (140)	47.16 (85)	49.78 (69)	80.88 (68)
Average past years	57.83 19 yrs.	65.34 20 yrs.	50.47 15 yrs.	56.87 15 yrs.	90.99 14 yrs.

BENIN

WARRI

Month	Ogba Farm Benin ins.	Ubiaja ins.	Auchi ins.	Ogwashi- Uku ins.	Sapele ins.	Warri ins.
January	0.59 (2)	1.61 (2)	0.04 (1)	0.04 (1)	1.48 (3)	1.71 (4)
February	0.52 (2)	1.49 (2)	0.09 (2)	—	—	1.49 (2)
March	4.46 (7)	3.33 (7)	2.22 (4)	3.24 (6)	2.59 (7)	2.30 (5)
April	2.84 (8)	6.44 (7)	1.70 (8)	4.83 (12)	7.07 (6)	12.28 (10)
May	10.74 (19)	10.43 (17)	7.49 (14)	4.62 (13)	5.81 (11)	19.09 (21)
June	10.29 (17)	9.98 (14)	6.31 (13)	11.20 (17)	14.74 (7)	12.79 (23)
July	9.53 (20)	6.68 (16)	3.95 (14)	13.07 (14)	14.98 (14)	9.93 (19)
August	2.85 (15)	2.41 (4)	1.17 (9)	2.98 (7)	2.92 (8)	7.44 (7)
September	5.93 (19)	13.75 (15)	8.06 (19)	9.10 (18)	14.11 (12)	9.27 (19)
October	7.48 (15)	7.81 (15)	5.53 (12)	7.38 (14)	8.60 (18)	16.90 (25)
November	2.75 (6)	1.34 (3)	1.36 (2)	2.33 (3)	1.32 (3)	3.23 (13)
December	0.33 (1)	—	—	—	—	0.13 (7)
Total	58.31 (131)	65.27 (98)	37.92 (98)	58.79 (105)	73.62 (75)	96.56 (141)
Average past years	82.76 27 yrs.	65.41 14 yrs.	44.08 4 yrs.	76.54 3 yrs.	86.15 4 yrs.	95.75 4 yrs.

APPENDIX I—continued

COLONY

ABEOKUTA-IJEBU

Month	Agege ins.	Badagry ins.	Epe ins.	Abeokuta ins.	Ijebu-Ode ins.
January	1.19 (4)	—	0.09 (1)	0.21 (3)	0.43 (2)
February	0.56 (3)	2.63 (2)	0.55 (2)	0.10 (2)	0.30 (1)
March	2.13 (7)	2.03 (4)	4.91 (6)	3.03 (3)	0.95 (1)
April	2.86 (8)	9.12 (11)	5.12 (6)	3.16 (10)	7.36 (6)
May	11.04 (14)	8.68 (15)	7.80 (12)	3.80 (10)	5.77 (7)
June	10.93 (20)	22.79 (16)	12.78 (16)	9.78 (16)	15.60 (7)
July	8.90 (13)	7.17 (12)	16.08 (17)	6.62 (16)	10.88 (7)
August	0.47 (2)	0.82 (3)	0.45 (5)	0.80 (4)	0.98 (2)
September	2.43 (10)	2.22 (5)	3.90 (15)	1.21 (11)	6.55 (7)
October	7.83 (16)	5.21 (10)	7.47 (15)	3.41 (14)	9.26 (10)
November	0.62 (7)	2.14 (6)	4.64 (6)	2.64 (6)	0.61 (2)
December	0.07 (1)	0.42	0.05 (1)	0.06 (1)	—
Total	49.03 (105)	63.23 (84)	64.65 (102)	34.82 (96)	58.69 (52)
Average past years	52.74 23 yrs.	47.08 4 yrs.	58.60 15 yrs.	43.86 10 yrs.	59.40 10 yrs.

OYO PROVINCE

(Number of wet days shown in brackets.)

Month	Oyo ins.	Ife ins.	Ilesha ins.	Oshogbo ins.	Ogbo- mosho ins.	Iseyin ins.	Shaki ins.
January	0.31 (2)	3.19 (2)	0.19 (2)	1.22 (2)	1.44 (3)	0.20 (1)	—
February	0.97 (1)	—	—	—	—	1.10 (1)	—
March	0.17 (1)	2.57 (4)	1.16 (5)	0.79 (4)	3.18 (3)	—	—
April	7.89 (10)	5.67 (7)	5.36 (11)	4.39 (9)	4.15 (10)	8.32 (9)	5.98 (8)
May	5.06 (10)	6.98 (8)	4.03 (7)	6.61 (11)	3.82 (8)	7.36 (8)	5.11 (10)
June	4.31 (14)	5.96 (8)	7.09 (8)	4.93 (13)	3.69 (14)	7.17 (10)	4.46 (11)
July	2.49 (10)	12.39 (15)	9.38 (13)	4.42 (11)	1.87 (16)	6.17 (11)	4.60 (9)
August	1.59 (3)	0.94 (4)	0.90 (4)	0.85 (4)	4.68 (5)	2.15 (6)	3.07 (5)
September	3.65 (6)	12.14 (15)	4.86 (12)	2.88 (9)	4.96 (10)	4.54 (6)	3.69 (10)
October	6.48 (13)	22.20 (21)	10.32 (21)	6.01 (16)	4.09 (15)	5.13 (13)	7.38 (14)
November	0.22 (1)	4.10 (7)	1.10 (5)	1.00 (2)	0.49 (3)	—	0.69 (3)
December	—	—	0.50 (1)	—	0.06 (1)	—	—
Total	33.14 (71)	76.14 (91)	44.89 (89)	33.10 (81)	32.43 (88)	42.14 (65)	34.98 (70)
Average past years	42.98 14 yrs.	66.01 9 yrs.	49.15 9 yrs.	44.07 13 yrs.	39.52 11 yrs.	44.07 8 yrs.	39.52 9 yrs.

MOOR PLANTATION METEOROLOGICAL OBSERVATIONS 1950 : HOURS OF OBSERVATION
9 A.M. AND 2 P.M.

Months	AIR TEMPERATURE					AVERAGE RELATIVE HUMIDITY		Rainfall in inches	No. of Days Rainfall	Average 1910- 1949 (40 yrs)
	MEANS		Average	ABSOLUTE		9 a.m.	2 p.m.			
	Max.	Min.		Max.	Min.					
	Degrees	Degrees	Degrees	Degrees	Degrees	per cent	per cent			
January ..	90.2 F	66.8 F	78.5 F	94.0 F	58.0 F	84.9	43.8	0.49	2	0.49
February ..	95.4 F	65.8 F	80.6 F	98.0 F	57.0 F	77.7	52.4	0.03	1	0.76
March ..	98.2 F	71.0 F	84.6 F	101.0 F	66.0 F	83.0	42.9	0.25	5	3.41
April ..	94.3 F	68.4 F	81.33 F	101.0 F	65.0 F	84.9	53.4	6.42	10	5.42
May ..	91.3 F	66.5 F	78.95 F	94.0 F	63.0 F	87.6	64.5	5.08	10	5.95
June ..	88.3 F	65.6 F	76.95 F	92.0 F	63.0 F	87.5	70.1	11.87	18	6.69
July ..	82.1 F	65.5 F	74.8 F	88.0 F	64.0 F	89.8	76.0	7.49	19	5.97
August ..	81.1 F	65.3 F	73.2 F	86.0 F	67.0 F	88.9	80.0	1.47	6	3.24
September ..	83.1 F	66.7 F	74.9 F	88.0 F	62.0 F	89.3	73.6	3.59	13	7.02
October ..	87.0 F	67.7 F	77.35 F	91.0 F	65.0 F	86.2	64.7	6.72	17	6.28
November ..	88.2 F	67.6 F	77.90 F	94.0 F	61.0 F	86.4	59.0	1.50	7	1.81
December ..	91.1 F	67.3 F	79.2 F	94.0 F	56.0 F	84.7	50.3	—	—	0.28
Total ..	1070.3	804.2	938.28	1121.0	741.0	1030.9	730.7	44.91	108	47.32
Mean ..	89.19	67.01	78.19	93.42	61.75	85.90	60.89	3.74	9	3.94

AGEGE DAIRY ACCOUNTS FOR THE FINANCIAL YEAR 1949-50

Dr

Dr	£	s	d	Cr	£	s	d
To Balance, transferred to Profit and Loss Account	..	3,297	12 10				
				By Balance—Brought forward			
				Colonial Government Account :—			
				Sales of Milk	3,121	17 0	
				Sales of Culled Cows	111	10 0	
				Sales of Vealed Calves	45	18 2	
				Sales of Milk Bottles	17	5 2	
				Sundry Sales	1	2 6	
					3,297	12 10	
					£3,297	12 10	

B.—Profit and Loss Account

[illegible]

C.—Balance Sheet as at 31st March, 1950

LIABILITIES

Colonial Government :—
Balance as at 1st April, 1949
Add WITHDRAWALS :—
Labour
Stores
Water
Railway Freight
Crown Agents' Indent

£	s	d
11,930	15	0
2,396	9	7
1,330	5	2
8	0	8
76	18	8
72	15	3
3,884	9	4

Deduct PAYMENTS :—
Sales of Milk, etc.

15,815	4	4
3,297	12	10
12,517	11	6
177	10	5

Sundry Creditors

ASSETS

Building as at 1st April, 1949
Building Materials as at 1st April, 1949

6,800	0	0
211	4	4
7,011	4	4

Deduct :—
Depreciation
Building Materials used and transferred to Profit and Loss Account

680	0	0
173	17	3

Tractors and Equipment as at 1st April, 1949
Add ADDITIONS DURING 1949-50 :—
(a) Ex Sundry Creditors
(b) Materials

853	17	3
1,556	0	11
177	10	5
6	10	9
184	1	2

Deduct :—

Depreciation

1,740	2	1
227	6	1

Delivery Van and Equipment as at 1st April, 1949
Add ADDITIONS during 1949-50

250	12	6
0	8	0

Deduct Depreciation

251	0	6
121	11	9

General Stores and Dairy Materials as at 1st April, 1949
Add ADDITIONS during 1949-50

1,052	10	9
368	16	10

Deduct Depreciation

1,421	7	7
-------	---	---

Sales to Sundry Debtors
Expenses transferred to Profit and Loss Account

28	0	0
15	8	0
302	14	1

Un-exhausted Improvements as at 1st April, 1949
Add Additions

346	2	1
210	0	0
166	12	9
376	12	9

6,157 7 1

1,512 16 0

129 8 9

1,075 5 6

<i>Deduct Loss</i>	..	..	..	53 19 9	
STOCK ON HAND ON 31ST MARCH					322 13 0
1950 :—					
Feeding Stuffs	..	..	..	100 12 1	
Tillages ..	..	..	..	370 0 0	
Cattle ..	..	..	..	1,312 4 8	
					1,782 16 9
Sundry Debtors	..	..	..	15 8 0	
Profit and Loss Account being loss for 1949-50	..	..	..	1,699 6 10	
					£12,695 1 11

APPENDIX III

AGEGE DAIRY ACCOUNTS FOR THE FINANCIAL YEAR 1950-51

A.—Production Account

<i>Dr</i>						£ s d			<i>Cr</i>
						£	s	d	
To Profit and Loss Account	..	..	..	..	By Milk Account ..	3,087	18	7	..
					„ Culled Cows Account ..	2,843	0	10	..
					„ Vealed Calves Account ..	170	10	11	..
					„ Milk Bottles Sales Account ..	50	3	5	..
					„ Miscellaneous Sales Account ..	13	15	8	..
						10	7	9	..
						£3,087	18	7	

B.—Profit and Loss Account

<i>Dr</i>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				</
-----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----

LIABILITIES

COLONIAL GOVT. ACCOUNT :—	£	s	d
Balance as at 1st April, 1950	12,517	11	6
<i>Add WITHDRAWALS :—</i>			
Main Labour ..	2,677	10	8
Main Stores ..	1,677	10	5
Water Account ..	8	12	4
Railway Freight ..	0	2	3
Cattle ..	292	0	0
	4,655	15	8
<i>Deduct :—</i>	17,173	7	2
Payments ..	3,087	18	7
Experimental Credits ..	1	17	6
	3,089	16	1
	14,083	11	1
<i>SUNDRY CREDITORS :—</i>			
O/C Fashola Agricultural Station ..	210	10	11
Socony Vacuum Oil Company ..	30	11	8
	241	2	7

Carried forward .. £14,324 13 8

ASSETS

	£	s	d	£	s	d
Buildings as at 1st April, 1950 ..				6,120	0	0
Building Materials as at 1st April, 1950 ..				37	7	1
				6,157	7	1
<i>Add ADDITIONS :—</i>						
Main Labour ..			210	19	0	
Main Stores ..			107	10	3	
				318	9	3
				6,475	16	4
<i>Deduct :—</i>						
Depreciation ..			612	0	0	
Balance, transferred to Profit and Loss Account being Repairs, etc.			298	12	0	
				910	12	0
				5,565	4	4
Tractors and Equipment as at 1st April, 1950 ..				1,512	16	0
<i>Add ADDITIONS :—</i>						
General Labour ..			96	9	2	
General Stores ..			285	13	10	
Sundry Creditors ..			42	12	0	
				424	15	0
				1,937	11	0
<i>Deduct :—</i>						
Depreciation ..			255	1	1	
Tractor, etc. returned to O/C Fashola Agricultural Station ..			49	11	6	
Balance, transferred to Profit and Loss Account ..			302	6	9	
				606	19	4
				1,330	11	8
General Stores and Dairy Materials as at 1st April, 1950 ..				1,075	5	6
<i>Add ADDITIONS :—</i>						
Main Labour ..			143	1	9	
Main Stores ..			417	19	11	
Repairs ..			7	6	1	
Sundry Creditors ..			55	8	0	
				623	15	9
				1,699	1	3
				Carried forward ..	£1,330	11 8

RESEARCH IN THE WESTERN PROVINCES

A.—Introduction

The research staff at Ibadan has continued to deal with problems applicable to Regions other than the Western. The Entomology section, dealing with problems for the whole of Nigeria is stationed here and likewise the Chemistry and Botany Sections supervise and plan work in the Eastern Provinces. It is hoped that research facilities will shortly be available at Umuahia so that the problems of the Eastern Provinces can be more fully investigated.

2. Some improvement in the staff position has occurred and the Entomology Section in particular has been strengthened by the appointment of a Senior Entomologist during the year and an Entomologist who arrived near the end of last year. The Botany Section has also been strengthened by one new appointment and one released from secondment to the Oil Palm Research Station, Benin.

3. The office of the post of Assistant Director (Experiments) was transferred from Samaru in the Northern Provinces to Ibadan so as to be in closer touch with Departmental Headquarters.

4. During the past few years it has been noticed that the dry season at Ibadan has tended to be more intense. As shown in the table below, this has been largely brought about by a marked falling off in the amount of rain received during the month of March, a most critical month for perennial crops such as cacao and citrus.

MEAN DRY SEASON RAINFALL IN INCHES FOR THE FOUR DECADES 1911-20, 1921-30, 1931-40, AND 1941-50, AT MOOR PLANTATION IBADAN

Decade	1	2	3	4
Month	1911-1920	1921-1930	1931-1940	1941-1950
November	2.18	1.65	1.79	1.71
December	0.14	0.35	0.42	0.22
January	0.11	0.54	0.70	0.43
February	0.72	0.83	0.85	0.53
March	4.32	3.14	4.39	1.99
Total	7.47	6.51	8.15	4.88

It would be premature to say whether this dry spell is part of a permanent trend or merely a phase in a climatic cycle. It remains, however, at present a factor to be reckoned with in all establishment work.

B.—Botany Section

COCOA

5. *Propagation*.—The vegetative propagation of cocoa was continued with the object of planting clonal blocks from which seed would be supplied for farmers. Propagation by budding has been largely given up in favour of rooting cuttings and latterly the closed bin has been replaced by the open sand-bed in which the cuttings are kept

moistened by a fine spray. While quick and ready rooting has been obtained, difficulty has been met in safely moving the plants into baskets of soil when the roots have formed and the suggestion has been made that the type of root produced in moist sand is brittle and unsuited to transplanting. Preliminary tests were accordingly made with other materials, such as rotted oil-palm stem, to replace sand in the propagator, and with various treatments of the rooted plants at the time of transferring to soil.

6. In the planting of young cocoa in the field it has become apparent that the banana shade used in the Botanist's plots in recent years has been much too close and the young cocoa plants have suffered from competition for water. The latest plantings are shaded by bananas at twenty feet spacing with *Gliricidia* interplanted at the same spacing.

7. It has however been abundantly proved that, even with the best shading, watering of young cocoa plants in their first dry season is necessary. The quantity of water given need not be large. In the case of seedlings of Amazon introductions, which are rather more vigorous and drought-resistant than the local, it was shown that under the conditions prevailing at Ibadan monthly waterings between December and February using two gallons a time were sufficient to keep the plants alive. More frequent watering enabled the plants to make new growth throughout the dry season.

8. *Selections*.—Evidence accumulates that the Nigerian Selection T38, selected as a mature plant on the strength of its high yield and large bean-size, is a slow starter in coming into production. Results from Ibadan Native Administration Cocoa Farm have failed to show that in its early years it is superior in yield to unselected plants such as a farmer would grow from local seed. Early maturity is a desirable feature in a cocoa required for replanting of Swollen Shoot areas and realisation of this possible defect in T38 has spurred on the search for something better. Arrangements have been made to introduce some of the Gold Coast selections under suitable conditions of quarantine, and observations are being continued on various introductions from Trinidad and South America.

9. In these circumstances the promising yield of some Nigerian-Trinidad hybrids attracted increasing attention. The progeny of crosses between the Nigerian T38 and Trinidad seedlings in their eighth year after planting continued to yield much more than the selfed seedlings of both parents. In the following table Trinidad CF176 and CF59 are open-pollinated seedlings of Imperial College Selections four and one respectively, and yields are expressed as weight of wet beans per acre.

<i>Variety</i>					<i>Wet beans per acre lb</i>
T38 x Trinidad CF176	..	..	..	..	2,408
T38 x Trinidad CF59	..	..	..	..	1,670
Trinidad CF59 selfed	..	..	..	..	747
T38 Selfed	..	..	..	..	596
Trinidad CF176 Selfed	..	..	..	..	328

If we assume a dry weight approximating to 42 per cent of the wet weight, the best hybrid produced over 1,000 lbs of dry cocoa per acre as against 250 lbs from T38. Unfortunately the means of putting these hybrids into wider use is not immediately apparent.

KOLA

10. Increased attention has been directed to this crop which plays a large part in the economy of the Western Provinces. A start was made in recording the yield of individual trees in several plots on land acquired for the new Farm at Agege. At Ibadan observations were continued on the prevalence of male and female flowers, in the search for a cause of the extreme variability in yield amongst individual trees. The study of the inheritance of cotyledon colour was resumed.

11. It was of interest to find during a visit to the Cameroons that the kola tree commonly planted in the villages of the Bamenda Highlands at 4,000 to 6,000 feet is not *C. Nitida* but agrees with the description of *C. Verticillata* Stapf. There is an extensive trade in this kola with the Moslem country immediately to the north.

CITRUS

12. There are great possibilities for development of citrus in the south where both yields and quality of fruits are high. Much information on the behaviour of different varieties and the use of various rootstocks has been amassed. This is being summarised with a view to assessing the present position and planning the next phase of work.

13. Yields of oranges and grapefruits have continued to be satisfactory at Ibadan, on plots receiving no fertiliser or cultural treatment. Records of yield in weight of fruit harvested have been kept for the last three years only. The number of boxes of Ruby Blood oranges produced between the ages of sixteen to eighteen years on various rootstock at Moor Plantation was as follows :—

Rootstock						Average No. of boxes (73.5 lbs) per tree
Mandarin	..	..	..	..	..	7.7
Sour Orange	..	..	..	..	..	6.1
Tangerine	..	..	..	..	..	5.6
Acid Lime	..	..	..	..	..	4.7
Sweet Orange	..	..	..	..	..	3.9
Grapefruit	..	..	..	..	..	3.9
Shaddock	..	..	..	..	..	2.6
Hybrid Lemon	..	..	..	..	..	1.1

14. The most outstanding variety of orange tested to date was the hybrid Lake Tangelo, and steps are being taken to propagate this on a large scale.

15. Comparative figures for the number of boxes of grapefruit for the same period were :—

Rootstock						Average No. of boxes (60 lbs) per tree
Sour Orange	..	..	..	..	..	7.8
Grapefruit	..	..	..	..	..	7.5
Tangerine	..	..	..	..	..	6.0
Acid Lime	..	..	..	..	..	5.6
Sweet Orange	..	..	..	..	..	4.6
Hybrid Lemon	..	..	..	..	..	4.6
Shaddock	..	..	..	..	..	2.7

COTTON

16. Work was restricted to the maintenance of the Improved Ishan selection and it was once more a losing fight against pest and disease. Prospects for the crop looked good until the time of harvesting when, for each boll safely gathered in, ten were found to be ruined by bollworm. Earlier in the season a number of plants suffered from symptoms of a disease to which Mr J. B. Hutchinson drew attention some years ago and which he suggested might be caused by a virus. Plants were reduced in size with very small leaves and few or no flowers. Occasional plants had been seen thus affected in other years but in this season nearly 5 per cent of the plants in the multiplication plot showed the symptoms and had to be destroyed.

MAIZE

17. An unprecedented occurrence was a severe epidemic of rust disease involving the early maize crop. This disease had not previously been recorded in Nigeria though it may possibly have occurred in slight form and passed unnoticed.

The pathogen has been identified by Dr G. R. Bisby of the Commonwealth Mycological Institute as *Puccinia polysora* Underw., a species of fungus new to Nigeria. The epidemic started in the south-west corner of the country adjoining the boundary with Dahomey but rapidly spread to north and east and was soon obvious on all maize throughout the Western Provinces. Attack was extremely severe and most plants were turned a rusty colour by the masses of spores. Yield of the crop was greatly reduced. Reports from the neighbouring countries of Dahomey and the Gold Coast to the west showed that they were suffering a similar disaster and there was evidently a tremendous build-up of this disease throughout West Africa. The uredo-stage only was seen in Nigeria. The second crop of maize, which is planted about a month after the first has been harvested, was less heavily attacked despite the abundance of spores which must have been everywhere, and evidently some predisposing factors besides presence of the spores affect the severity of attack.

18. This epidemic of rust stressed the urgency of improving the varieties of maize in use and of endeavouring to include some measure of resistance to this disease. Arrangements were accordingly made to introduce a wide range of varieties from different countries for trial.

MISCELLANEOUS CROPS

19. *Cassava*.—Varietal trials of cassava were continued at Umuahia and Ibadan. In both trials the Gold Coast variety GC997B (Garri) gave the high yield expected of it, but at Umuahia it was surpassed by two local varieties which were included in the trial for the first time and which gave $9\frac{1}{2}$ and $8\frac{1}{2}$ tons of roots per acre. It is possible that the yield of variety GC997B has dropped since the stock became generally infected with mosaic.

20. *Cowpeas*.—The testing of cowpeas varieties was continued in a trial in which the cowpeas were intercropped with maize. This trial led to no conclusion as to which cowpeas variety is best since the results, although highly significant, were at variance with results of previous years. It did however confirm a former result in showing that yield of maize is unaffected by the yield of intercropped cowpeas, the maize yielding as well on the plots giving a cowpea yield of nearly 4 cwt per acre of beans as on the plots where cowpeas failed entirely. Observations were continued on various other leguminous crops of possible use in the diet or as animal fodder.

PLANT INTRODUCTIONS

21. Planting-material introduced for the Department through the Botany Section included selected coconuts from Ceylon, grasses from Kenya and Southern Rhodesia, black pepper from Malaya, date palms from North Africa, and maize varieties from the United States, Canada and South Africa. In exchange, seed of local crops was sent on request to many countries.

BLACK POD DISEASE OF COCOA

22. The work of the Plant Pathologist has been devoted to investigation on black pod disease of Cocoa (*Phytophthora palmivora*).

23. It has been shown that frequent and regular applications of 1 per cent Bordeaux mixture can reduce the number of black pods. When there was a loss of 70 per cent of the pods without spraying, Bordeaux mixture apparently reduced the loss to less than 10 per cent when applied at weekly, fortnightly or three-weekly intervals. Spray applications at monthly intervals were less effective in another experiment comparing Perenox and Bordeaux mixture; the losses were reduced to about one half of those which occurred in the plots which were not sprayed.

24. There were significant increases in yield of cocoa attributable to the black pods which were saved by spraying. However, it is evident that the costs of spraying can only be recovered when there is a sufficiency of potential crop, which would otherwise be lost through disease. Control of black pod disease by spraying will only be economic in small properties when potential tree yields are relatively large.

25. Experiments have also been conducted with a view to making recommendations suitable for disease control on small properties. Current advice has been to the effect that black pods should be regularly removed from the trees, but there has been uncertainty as to the frequency of removal. This problem has been approached through inoculation experiments, with observations on the interval of time which elapses between infection and fructification. It has been found that production of sporangia may start after an interval of about ninety hours from time of inoculation. However, it must be emphasized that external symptoms of infection may not appear until about sixty hours after infection but that sporangia may be produced thirty hours later. The implications from these observations are that when infected pods are being removed regularly, it is undesirable that more than one day should elapse between inspection rounds. Otherwise, fructifications may start on infected pods which were overlooked at the time of the previous inspection. In order to reduce the possibilities for further infection, it is necessary to avoid fructification on pods in the area under control.

26. Results from experiments on control by removal of infected pods have confirmed the findings from inoculation experiments. It has been found that removal of black pods every other day results in a smaller number of black pods when compared with removal of diseased pods every week or every month. There was no significant difference between the numbers of black pods at these longer intervals, which are therefore considered to be relatively ineffective as control measures.

27. Further experiments have confirmed the previous observations which indicated that black pods when removed from the tree and left on the ground may lead to infection of healthy pods. Therefore, it is important that diseased pods should be buried or otherwise disposed of and not left uncovered on the ground.

28. Various observations have been made on the general epidemiology of black pod disease. The results are summarized below.

- (i) In addition to spread of the disease from pod to pod on the same tree, there appears also to be a much wider dispersion, presumably by wind, up to distances of at least fifty yards.
- (ii) There has been no evidence to suggest that infection spreads from indigenous plants or from crops other than cocoa.
- (iii) Infection of pods from affected cushions does not appear to be an important phenomenon in Nigeria. Further observations are being made on the circumstances associated with the occurrence of pod infection *via* the stalk, as opposed to external infection by sporangia, which latter is believed to be the more usual mode of infection.

29. In order to obtain information on the severity of black pod disease in various parts of the Western Provinces, a survey was made in August and September. With the help of six assistants, fifty-nine cocoa farms were visited, one hundred or more cocoa trees were observed in each property, healthy and diseased pods were counted. During the survey of these cocoa farms subsidiary observations were made on the epiphytic plants present on the cocoa trees. It has now been found that these epiphytes can provide useful information on the rainfall conditions pertaining to a farm.

C.—Chemistry Section

SOIL SURVEYS

30. A field examination of soils was made in an area of about sixteen square miles near Ijebu-Igbo, which is the site of an agricultural project of the Western Region Development Board. The land, which is under forest at present, was found to be mostly of a rolling nature, suitable for agricultural development, but the occurrence of some steeply sloping ravines, especially near the northern boundary, was reported, and it was recommended that these should be kept under forest or fuel plantations. Good clayey soils, which were considered to be largely suitable for cocoa, were found on the higher ground throughout the area; only relatively small amounts of sandy soil were encountered, in lower lying places, and these were considered very suitable for oil-palms but not for other crops.

31. A semi-detailed soil survey was made of an area of about 150 acres near Ikire, where a co-operative farming scheme, also under the supervision of the Western Region Development Board, was proposed; this was to have been based mainly on an oil-palm plantation. Here unfortunately it was found that the greater part of the area had a very poor type of soil, with a sub-soil layer consisting of almost pure gravel (classified as the Ife Series), and no agricultural development could be recommended. The land was mostly under old forest regrowth, having been found in the past to be of little use for agriculture.

FIELD EXPERIMENT

32. *Moor Plantation.*—Two fertiliser experiments which were started in 1946 were continued. These are on two of the new rotations on the main experimental fields where continuous cropping has been in progress since 1922. The history of these fields is that crop yields were fully maintained until 1934 under the original rotation, which included generous use of mucuna as green manure; other rotations were then adopted, using less frequent mucuna crops, some of which were only interplanted

through maize instead of being grown as pure covers, and which were disposed of more often by burning than by digging them in; these rotations led to a general decline in yields, which has been attributed mainly to nitrate deficiency. In the present rotations it was hoped that the nitrate supply would again be improved. The purpose of the fertiliser experiments is to indicate what deficiencies of any major nutrients prevail under the present conditions, and results to date have been a general response to ammonium sulphate, and no response to potash fertiliser, whilst superphosphate has sometimes given increases in yield and sometimes not. In 1950 the results obtained with the yam crop in Rotation P were as follows :—

<i>Treatment</i>	<i>O</i>	<i>P</i>	<i>PK</i>	<i>N</i>	<i>NP</i>	<i>NPK</i>
Nett yield (lb/acre)	5,430	6,200	5,730	9,190	7,450	7,860
Average yield no N plots	..	..	..	5,780 lb/acre		
Average yield N plots	..	..	..	8,160 lb/acre		
Increase due to N plots	..	..	..	2,380 lb/acre		

P and K were without apparent effect, whilst N gave a considerable increase of yield.

The early maize crop on Moor Plantation was very badly affected by stem-borer attack. It is of some interest that in these circumstances a phosphate, which acts especially in the earliest stages of growth of a grain crop, had a marked effect on yields, presumably by giving more vigorous growth at the time of the attack :—

<i>Treatment</i>	<i>O</i>	<i>P</i>	<i>PK</i>	<i>N</i>	<i>NP</i>	<i>NPK</i>
Yield (lb dry grain/acre) ..	157	244	242	177	230	234

33. *Fertiliser experiment on tobacco*.—A factorial experiment with applications of N, P and K at three levels was laid down at Ago-Are; additional unmanured plots were included. The results were unsatisfactory, mainly on account of unevenness of the soil, but the indications given were disappointing. Phosphate and potash both had no apparent effect on yield or quality (as shown by grading of the cured leaves), whilst nitrogen gave a small increase in yield but no improvement in quality; careful observation during growth, by the Tobacco Company's Leaf Manager and the Agricultural Chemist, however, strongly suggested an improvement in quality resulting both from nitrogen and from phosphate applications. It is pointed out that consistent results are unlikely to be obtained with fertilisers applied to tobacco in this area, on account of the fact that the crop is not grown at any definite stage of the local rotation.

LABORATORY WORK

34. A large number of old soil samples which had been awaiting attention were analysed during the year. Some profiles from the Ikeja market-garden scheme gave analytical results typical of the productive reddish sandy loams of the Colony area. Three profiles from Refuge Island in Lekki Lagoon, where some agricultural development had been suggested, were found to be those of very poor coarse sands with very low amounts of organic matter and exchangeable bases. Figures were obtained for a few profiles from the Ijebu-Igbo Project, and did not differ from those for typical soils of cocoa-growing areas elsewhere in the Western Provinces.

A number of samples of fodders, silage, and manures from Experiment Stations in the Western Region were examined.

35. *Citrus*.—Citric acid and total solids were determined in samples of various citrus fruits from the Moor Plantation collection, for the Senior Botanist. In addition, a commercial firm in the United Kingdom has been interested in a possible trade in lemon juice, as a result of a visit by their representative in April 1950. Since then

fortnightly analyses of juice from local lemons have been done; these have shown a very satisfactory quality, which has been maintained above the required standard throughout. In addition to the fortnightly analyses made at Ibadan, monthly samples were sent to the United Kingdom for analysis which included flavour and colour gradings. The results of these analyses over an eight month period have clearly indicated that lemon juice from Nigeria can compete equally well with those from other countries.

36. *Tetracarpidium*.—At the request of the Department of Commerce and Industries *Tetracarpidium conophorum* nuts were again bought and processed for despatch to the United Kingdom, as the drying equipment ordered by them for producing larger shipments had not yet arrived. 7,150 pounds of fresh-nuts were dried, giving 2,690 pounds of dried-nuts. Samples of the finished product varied from 4.5 to 7.4 per cent in moisture (average 5.7 per cent), from 45 to 51 per cent in oil (average 49 per cent), and from 0.5 to 1.8 per cent in F.F.A. of the oil (average 0.7 per cent.)

STUDIES OF SOIL FERTILITY

37. A set of soil samples was collected from two of the main Cultural Experiments at the Oil Palm Research Station (Benin) for analysis, in comparison with similar sets of samples taken in 1941 and again in 1945. On each occasion a composite sample for each plot has been made up from ten or twelve separate spot samples, this being necessary in order to reduce sampling errors sufficiently. When analyses are complete they will give information of practical importance on the changes which may occur in the soil in the climatic conditions of Oil Palm Research Station under different treatments; the results for plots on which palms are established with "intercropping to exhaustion" will be of special interest, and the present indications are that under the moderate rainfall of seventy inches losses of nutrients by leaching and loss of organic matter are much less rapid than has often been supposed.

38. Determinations of exchangeable potash have been made on the soil samples from the Oil Palm Research Station experiments referred to above, and also on composite soil samples collected in 1943 from the main palm blocks at the Agricultural Station at Nkwelle, Onitsha, where there was severe "bronzing disease". Previous work (manuring experiments, supplemented by spectroscopic analyses of leaf material at Rothamsted) has shown that this condition is due to potash deficiency. The amounts of exchangeable potash in these soils are very small and the determination presented considerable difficulties, but an unpublished method of Rice Williams, in use in the National Agricultural Advisory Service at Aberystwyth, has been found to give reproducible figures.

39. The preliminary results are very interesting, as they not only suggest a rough lower limit of adequacy of exchangeable potash for oil palms in the Nkwelle soils, but also indicate that the ratios of exchangeable potash to other exchangeable bases (calcium and magnesium) are very important, absorption of potash being diminished when these ratios are very low. The Nkwelle and Oil Palm Research Station soils are, on the whole, moderately leached and contain more exchangeable calcium and magnesium than the excessively leached yellowish-brown soils of Calabar, for example; and it seems that there may, in general, be a better nutritional balance in the latter soils for oil-palm growth than in the soils of moderate leaching.

SOIL TYPES AND SOIL MAP OF NIGERIA

40. Information collected in recent years has been compiled to enable a new small-scale provisional soil map of Nigeria to be drawn and a list of most of the recognisable soil types of the country to be made. The units described here as "soil types" (as in other reports on African soils) consist of soils having the same mode of origin and the same general profile features, and these will be subdivided in later work into Soil Series. The map shows sixteen geographical groups of soil types, and the groups also should be subdivided later into about fifty or sixty Soil Associations. The classification takes account of the drainage, the intensity of leaching, and the humus content, in the first place. Nine-tenths of the country appears to be characterised by moderately to strongly leached freely-drained soils, of low to medium humus content, and mostly reddish in colour, and these soils have been divided into nine groups on the basis of parent material and parent rock, and the presence or absence of ferruginous concretions or hardpans. The remaining one-tenth is made up of three groups characterised by swamps and soils of poor drainage, a group of soils in the Bamenda Highlands with a high humus content, and three very important groups in the extreme South, which are excessively leached and are yellowish-brown in colour.

D.—Entomology Section

COCOA PESTS AND DISEASES

41. *Parasites of the Vectors of Swollen Shoot Disease.*—Throughout the year the survey of the indigenous parasites of mealy-bugs on cocoa has continued. It was found impossible to combine this work with the many other commitments of the Cocoa Survey Section of the Department, and a separate unit was formed under the Entomologist. Three Entomological Assistants and six skilled labourers are fully employed in the survey. As yet, the survey has not been extended beyond Oyo, Ondo and Abeokuta Provinces and the Colony. Approximately, 20,000 mealy-bugs have been collected. Until September 1950 when an Entomological Assistant returned from a course of training at the West African Cocoa Research Institute, pressure of work made it impossible for either of the Entomologists to identify all the mealy-bugs collected. They are now recorded by their species but we are still unable to identify all the parasites reared and this work is undertaken by the West African Cocoa Research Institute.

42. Since local identification of the mealy-bugs began some 1,640 specimens have been collected. By far the most common species are *Pseudococcus citri* and *P. njalensis*; together these two species comprised 93 per cent of the catch, 46 per cent being of the former, and 47 per cent of the latter species. Other mealy-bugs which are occasionally taken include, *Pseudococcus longispinus*, *P. bukobensis*, *Ferrisia virgata*, and *Tylococcus westwoodi*. At best the facilities available are such as to provide only a vague localised idea of the true distribution of the species.

43. The most common *genera* of parasites are *Cheiloneurus*, *Leptomastix*, and *Anagyrus*. At present insufficient numbers of parasites have been determined to enable accurate specific rates of parasitism to be calculated. But it already appears that the combined parasitism rates differ greatly for different species of mealy-bugs. Thus, 11 per cent of all specimens of *Pseudococcus citri* have been parasitised, whereas only 1 per cent of *P. njalensis* is affected. Again, of the 478 specimens of *P. bukobensis* which have been collected 24 per cent have been parasitised. It is, therefore, considered essential to obtain much more data on these interesting results before the introduction of parasites from foreign countries can be attempted.

44. *A Stem Borer of Cocoa. (Coccotrypes pygmaeus) (SCOLYTIDAE).*—The results of the attacks on these beetles on young cocoa plants continue to be serious. It has been confirmed that plants which are unshaded and lack water are more liable to be damaged. Well tended and vigorous plants seem able to grow despite the attacks. In the laboratory, painting the stems with a DDT or "gammexane" preparation protects the plant for some time and beetles confined on the stems of treated plants are quickly killed. However, in the field the protection does not appear to be as effective and experiments are being carried out to discover the reasons for these different results. Unfortunately, one field trial was interrupted by a serious attack of white ants which destroyed some of the observation plots. This was successfully overcome by a heavy application of "gammexane" preparation (Agroside 2) to the soil.

CHRYSOPS RESEARCH

45. From June until December 1950, an Assistant was stationed at Benin to continue investigations into the biology, life-history and habits of these important vectors of Loiasis. As a result of this our knowledge of the two species was greatly increased. The determination of the species in the larval stages is still a major problem, and the necessity of rearing to the adult stage all larvae collected wastes valuable time. Detailed studies of the taxonomy of the larvae are now being undertaken and there is some hope that a key to generic and specific differences may be prepared. The structure of the organ of Graber is receiving particular attention.

46. Experiments on the distribution of the larvae within the mud confirmed that they are confined to damp and saturated mud and are not found under any depth of surface water. Within these habitats they are confined to the top four inches of mud. The delimitation of the habitat has an important bearing on the use of insecticides for controlling the immature stages. Unlike other Tabanids the two species of *Chrysops* do not appear to have a larval resting stage, at least between May and November. At Benin the average length of life in the larval stage of both species after capture is about fourteen days. With other Tabanids the average is fifty-four days and on one occasion a larva lived for 124 days in captivity.

47. The bimodal seasonal distribution of adults of the two species has been confirmed. *Chrysops silacea* appears in large numbers in August whereas the peak incidence of *C. dimidiata* occurs in October. This bimodal distribution appears to be correlated with the local precipitation. As the rains increase the population of *C. silacea* decreases whereas the population of *C. dimidiata* rises; similarly, as the rains decrease so does the population of *C. silacea*.

48. For the first time at Benin a few marked flies were recovered, showing a flight range of up to $\frac{3}{4}$ mile from the breeding grounds, and there is no reason to suppose that this is the maximum distance which may be covered. Until the maximum flight range has been discovered it is impossible to say to what length of the river control measures should be applied. Collection in the forest canopy have shown that both species of *Chrysops* are present but are not as abundant as they are at ground level.

49. Problems of control have received careful consideration. Drainage provides the most obvious solution as suitable breeding sites could thus be easily destroyed. Canalising the river between definite banks would undoubtedly be very effective although costly. Nevertheless, once the initial operations have been carried out, the cost of upkeep would be small as the level of the river varies little throughout the year.

COTTON PESTS

50. *Capsids and Bollworms of Cotton*.—For the past two years the damage caused by the Capsid *Helopeltis sanguineus* has been remarkably slight, and as a result it has been decided to reintroduce cotton into the rotations on Moor Plantation. Trials were designed to compare the effectiveness of "Toxaphene", DDT, and "Gammexane" at varying concentrations but the scarcity of the pest completely invalidated the results. They were, however, continued in August to record the effect on bollworm attack, but the results achieved were not significant. This was certainly due in part to the unfortunate lay-out of the experiment whereby control blocks were protected, to some extent, by the surrounding treated blocks. It is presumably significant that in samples of bolls (5,000) from all the blocks only about 10 per cent suffered from bollworm attack whereas in other cotton plots in the vicinity which were not treated in any way, losses due to bollworm (mainly *Platyedra gossypiella* and *Diparopsis castanea*) were as high as 90 per cent. It is intended to follow up this indication using larger acreages and a modified lay-out.

TSETSE FLY INVESTIGATIONS

51. Between June and March, several fly counts were made on Government farms at Ibadan, Fashola, Obomosho and Agege, and blood smears from animals suspected of having trypanosomiasis have been examined. At Fashola, where a herd of N'dama cattle are kept to test their resistance to the local strains of Trypanosomes the most common species of tsetse is *Glossina palpalis*. The population appears to be at its highest in August (after the beginning of the rains) but there is also a subsidiary rise in numbers in February during the dry season. Of the flies dissected none was found to be infective, a result comparable with all previous investigations at Fashola. Throughout the period only one specimen of *G. tachinoides* was taken.

52. At Ogbomosho *Glossina tachinoides* is found in equal numbers with *G. palpalis*, but the incidence of both species is lower than at Fashola and rarely exceeds one fly per boy hour. On the dairy farm at Agege the population is again low although several cases of trypanosomiasis have been reported there. *G. palpalis* is normally the only species found but on two occasions the Assistant in charge of the work reported the presence of *G. tachinoides*. This is a most unusual record and we are seeking confirmation.

53. On Moor Plantation at Ibadan the population of *Glossina palpalis* (the only species known to occur) remains fairly constant at about 0.5 flies per boy hour with a slight increase in numbers recorded in March. Cases of trypanosomiasis have been rare as the dairy herd have been kept by day in fly proof buildings.

MINOR PESTS

54. *Army Worms on Maize*.—In May and June outbreaks of army worms (*Laphygma exempta*) caused severe damage to young maize in the Ibadan area and certain other localities in the Western Provinces. Trenches dug around the fields, provided they were completed in advance of the attack gave some control, and this method was recommended to the local farmers. On Moor Plantation, after the attack had begun, some fields were sprayed with 2.5 per cent DDT and then trenched to prevent re-infestation; by this method a part of the corn was saved. Applications of DDT dust did not give an effective control.

55. *The Oil Palm Leaf Miner*.—A serious outbreak of this pest (*Coelaenomenodera elaeidis*) began near Ife at the end of September. Few, if any, palms were killed but a great number were damaged. Outbreaks of this pest are sporadic and, although common in neighbouring territories, it is many years since a similar outbreak was recorded in Nigeria.

56. Owing to the conditions under which Oil Palms are cropped by the local villagers, insecticidal control is impossible. Cultural methods adopted in other countries, especially pruning and destroying the damaged leaves have been recommended. The reasons for these sporadic outbreaks are not obvious but may be related to a numerical fluctuation of the parasites and predators which normally limit the abundance of the pest. This is being studied at Ibadan, where attempts to collect parasites of the various stages of the life history have begun ; as yet, no parasites have emerged.

57. *Citrus Pests*.—Throughout the year citrus crops have suffered only minor losses. Outbreaks of fruit piercing moths (*Achaea spp.* and *Othreis spp.*) normally serious, have been rare and have caused little damage. The Coreid, *Leptoglossus membranaceus*, which had caused severe damage in the two previous years was uncommon and no control measures were necessary nor was it possible to obtain sufficient material for insecticidal trials.

58. In the nursery, Aphids were a minor pest but sprays containing either DDT or "gammexane" gave a good control. Liquid Agrocide 3 appeared to be the most effective and is most easily prepared.

59. *Miscellaneous Pests*.—In June, cowpeas were badly attacked by the Galerucid beetle, *Oothea mutabilis*. A spray containing 0.5 per cent DDT gave some control but frequent applications were necessary. Guava seedlings were badly attacked by *Helopeltis sanguineus* and later, carrots suffered severely from attacks of the same Capsid. Both adults and nymphs were present ; this is the first time that carrots have been attacked by this pest in Nigeria. As insecticidal control was unsuccessful, hand picking was attempted and this eventually stopped the attack.

INSECT COLLECTIONS

60. The work of renewing the insect collections at Ibadan has continued, though handicapped by the lack of a technician or a systematist. Many species have been added to the collections especially in the families Coleoptera and Hymenoptera. About 250 species have been sent to the Commonwealth Institute of Entomology for determination.

REPORT OF THE AGRICULTURAL DEPARTMENT: EASTERN PROVINCES

A.—Staff and General

1. The Senior Service Staff position improved during the year by the posting of six new officers to the Eastern Region. These included one Agricultural Officer, two Agricultural Superintendents (including one non-expatriate Officer) two Agricultural Development Officers and one Cocoa Survey Officer. The services of an Entomologist were also available for part of the year. These gains were unfortunately partly offset by the transfer of one Senior Agricultural Officer to Departmental Headquarters and another to Malaya, while one Agricultural Superintendent was transferred to the Western Region.

2. Apart from the loss of these Agricultural Officers, the Region has temporarily lost the services of an Agricultural Superintendent who is studying swamp rice growing in Sierra Leone. The experience he will gain there will be of great use in tackling the problems of the Delta area. In addition, the African officer of the Junior Service promoted on trial to the Senior Service has been seconded to the Oil Palm Research Station, Benin, and is not available for duties in the Region.

3. In spite of the numerous and unavoidable changes in postings and the fact that the very great majority of the Senior Service are in their first tour of service, it can be truthfully said the work of the Department has not suffered as much as might be expected. The keenness and energy of these officers, assisted by insufficient numbers of experienced Junior Service Staff, have enabled the work of the Department to go forward without any serious set-backs.

4. The problem of strengthening the Junior Service Staff of the Eastern Region was mentioned in the last Annual Report. Provision has now been made in the revised ten-year plan approved by members of the Eastern Region House of Assembly for a School of Agriculture at Enugu to train Agricultural Assistants and Field Overseers. It is not expected that rapid progress will be made in establishing this school owing to difficulties in obtaining a suitable site in the neighbourhood of Enugu.

5. *Eastern Regional Production Development Board.*—The Department has worked in very close co-operation with the Eastern Regional Production Development Board throughout the year. A number of important schemes to be financed and managed by the Board have been initiated by the Department and its advice has been sought on a several more. In addition, the organisation of the Department has been put at the disposal of the Board wherever possible for the conduct of surveys, supply of planting material such as oil palm seedlings, and loan of advisory staff. A detailed description of these activities more properly belongs to the Board's own Annual Report, but the following schemes approved by the Board and by His Excellency the Governor in which the Department is fully interested may be mentioned :—

- (i) £200,000 Scheme for the commercial distribution of mixed fertilisers ;
- (ii) Oil Palm Plantation Schemes, one of 10,000 acres and two smaller plantations based on Pioneer Mills ;
- (iii) Cashew nut plantation, Onitsha Province ;
- (iv) Erection and operation of rice mills ;
- (v) Scheme for the distribution of concentrated feedingstuffs to livestock owners ;
- (vi) Arabica coffee plantation, Bamenda Province.

Other Schemes have been prepared or are in preparation for the Board's consideration.

6. Much investigational work devolves upon Agricultural Officers as a result of the large number of applications for loans for agricultural purposes from the Eastern Regional Development Board. This has been reduced by a system of screening recently adopted.

7. *Agricultural Education.*—The Community Development Officer in the Region has sought the co-operation of the Department in furthering schemes of help. Preparations have been made for training a few selected persons or

Farms for a year in improved methods of agriculture, including the use of artificial fertilisers, properly made compost and soil conservation. These persons, who are to be illiterate working farmers, are to return to their villages and provide an example to others in the application of the simple methods taught to them. Schemes have been prepared at Bamenda for training farmers with a view to settlement in groups assisted by mechanical or animal cultivation. The special training schemes for ex-servicemen have now finished, but the progress of the trainees on their farms is being followed up. A group of six is established near Enugu. In effect the largest group-farming demonstration in the Region is provided by the forty resident labourers at Nkwelle Farm. These men are cultivating a large area on the contour, purchasing fertiliser and applying it according to the Agricultural Department's instructions. The successful results are readily visible to the eye.

8. *New Stations and Prospects.*—No new stations were opened during the year but renewed efforts were made to find a suitable site for a Provincial farm near Kumba. In the meantime, it was found possible to find a site for the Cocoa Survey Officer's house in the station at Kumba and to start building his house.

9. *Rivers Province.*—Further surveys of the agricultural prospects in Rivers Province were made. Conditions in this Province make it unlikely that agricultural services will be based on a provincial experimental farm as is usual elsewhere. The difficulties of creek transport are such that series of demonstration farm centres or trial plots are more likely to meet local needs. Much will depend on whether satisfactory use can be made of the great net-work of mangrove swamps for rice growing and this will form one of the most important lines of investigation.

10. *Rice Research Station.*—It has been decided to abandon, for the time being, the idea of an extensive sub-station for rice research for the Region as difficulties have been met in obtaining land. In any event, the wide variations in conditions and the steady progress already being made lend support to the view that a more widely dispersed form of research will be better adapted to the needs of the Region.

11. *Provincial Farms.*—At the new Provincial farms of Abakaliki and Obio Akpa, Abak, excellent progress has been made in the lay-out and contouring programmes on which much emphasis is being laid. At Abak, the undulating nature of the land has made the contour lay-out particularly striking and there is already evidence of soil conservation as a result of the contour bunding. At Abakaliki, the large development building programme, including mechanical workshops, has now been completed by the Public Works Department. At Bambui farm, Bamenda, fifty acres of the new extension have been terraced and mechanical cultivation has started. Pastures have been laid out and new kraals erected. The building programme is not yet completed.

12. At the two older farms of Nkwelle, Onitsha Province, and Umudike, Owerri Province, gradual reorganization is in progress to permit of adequate soil conservation and strip cropping. It is considered extremely important that demonstration of soil conservation should be available on our provincial farms on a scale big enough to strike the public eye. This entails the replanting of permanent crops in other parts of the farm and the closing down of experiments which have ended their term of usefulness.

13. The demonstration work of Provincial farms is repeated in miniature at the demonstration farm centres at :—

Akwete	— Owerri Province.
Ukpabi	— Onitsha Province.
Wum	} — Bamenda Province (Native Administration.)
Babungo	
Banso	
Santa	
Oron	} — Calabar Province.
Essene	

A reduction of one in Owerri Province has been made necessary owing to lack of supervisory staff.

14. Among the most encouraging features of agricultural work in the Eastern Region is the increasing interest taken by the educated African and the lessening of suspicion evinced by the small farmer. It is felt that he is beginning to realise that we are out to help him and that he can profit himself by introducing new crops and more up-to-date measures. Unofficial members of the House of Assembly have shown a real interest in visiting our Provincial farms and the liaison committee has made useful suggestions.

B.—The 1950 Season

15. The total rainfall for the year was rather below average and the distribution has not been ideal. A long break in the rains during July to August adversely affected some crops, particularly late planted rice in Abakaliki and Ogoja Divisions. October and early November rains were, however, plentiful and the season ended much more satisfactorily than was originally expected. Indeed, some crops, notably yams in Owerri and Ogoja Provinces which are the two main producing areas, were reported to be above average. Markets have been well supplied with foodstuffs and prices have been high as is only to be expected ; even in Bamenda Province, where the general level is below that of the rest of the Region, a small rise in the price of some articles has been noticed.

16. The amount of gari railed North was 16,992 tons, compared with 5,530 tons in 1949 and 15,778 tons in 1948.

17. Investigations on the troublesome yam beetle (*Heteroligus claudius* Klug) were resumed on a more intensive scale by the Entomologist.

18. Typical rainfall figures are given in Appendix I of this report.

C.—Animal Husbandry

19. *Zebu Cattle*.—At Bambui farm, Bamenda, the policy of breeding to introduce a type of animal suitable for mixed farmers continues. Seven stud bulls have been used during the year, five of the Adamawa breed (Figure 1) and two Adamawa x White Fulani. The net increase at Bambui and outstations was nine head ; fifty calves were born, twenty head were sold to mixed farmers and eleven head were sold as culls. Twenty lactations were completed by eighteen cows during the year. A minimum yield of 150 gallons during a 305 day lactation is being adopted for culling purposes, and ten cows exceeded the standard laid down. The capacity for recording will be doubled on completion of the new shed on the new extension. The health of the cattle was good and all passed T.B. tests carried out by the Veterinary Department.

20. *West African Short-horn (Dwarf) Cattle*.—At Abakaliki, where prospects for animal husbandry are quite promising, progress has been made with grading locally purchased dwarf cattle with the N'dama bull obtained from Oyo. Six more dwarf heifers were purchased with some difficulty locally in addition to the three previously in the herd. The first two half-bred calves have done extremely well. The Veterinary Department are retesting all stock for contagious abortion. Experimental rinderpest immunisations with lapinised virus were also carried out. At Umudike farm, the reduced herd has improved in condition but a few cases of trypanosomiasis were recorded. At Nkwelle farm, where the policy is similar to Abakaliki,—the cattle are now in a promising stage. The half-bred crosses are now breeding, having been crossed back to N'dama. The progeny of these are a very good type, of excellent conformation and show signs of being hardy and disease resistant. The colour of the N'dama is completely dominant over the mixed marking of the first cross. Another interesting factor, the polling of some calves, is appearing. Those not polled will be dehorned to make the herd uniform.

21. *Sheep*.—At Abakaliki the sheep have done well and some prolific lines have begun to show up. During the year, thirty-nine lambs were born of which only one died so that it is now possible to cull and raise the standard of the flock. The flock at Umuahia also improved in condition and numbers with longer grazing hours but the flock is not as prolific as that at Abakaliki. Sheep have a useful part to play in mixed farming in the "fly" infected areas of the Eastern Provinces.

22. *Pigs*.—As indicated in the last annual report the policy of offering weaners to private pig keepers on condition they adhered to Departmental requirements has not proved as popular as was expected. The demand for breeding stock which has high prestige value was, therefore, met in a number of cases. At the older Departmental piggeries, the main aim has been to produce a steady output throughout the year. The reorganization has largely been achieved and is a good example to breeders, besides being convenient for the Department. This is possible because the more exacting part of our experimental work on rations and management is now complete and permits piggeries to be organized more nearly on commercial lines. Small scale experiments to deal with local variations in food supplies still continue.

23. A two-pen piggery was started at Umuahia in order to investigate the economics of rearing weaners by keeping actual costs. A start was made in stocking the new piggery at Abak with two batches of weaners.

24. *Poultry*.—Work on Rhode Island Red poultry was concentrated at Umuahia and Abakaliki, where a new start was made at both farms. At Umuahia the original mature stock was disposed of and a foundation flock selected from 138 birds received from Oyo Poultry Farm and some young stock from the previous season's breeding. From these eventually ninety pullets and twelve cockerels were selected for future breeding, the remainder being issued to farmers. With the valuable assistance of the Senior Rural Education Officer a successful year's breeding work was experienced. Stock on hand at the end of the year was about 256 birds, from which it is intended to stock other provincial farms. Though the conditions for poultry keeping at Umuahia are not as favourable as in some parts of Nigeria, reasonable success can be attained if chicks are culled early and the basic rules of management carefully followed, namely, the provision of shade, free range, adequate water, green food and oyster shell grit.

25. *Ducks*.—At Abakaliki, the male stock is from Agege and is doing well and the excellent flock at Umudike had progressed satisfactorily.

26. *Fodder Crops and Pastures*.—Bamenda Province offers wide scope for the improvement of pastures. So far, the introduction of Kikuyu grass is proving a success and it promises of being a likely successor to the local coarse *Sporobolus*. It rapidly produces a good cover and is much liked by the cattle, especially during the dry season when it keeps green. Another introduction, Rhodes grass did not survive the dry season nearly as well as Kikuyu; though it produced plenty of runners during the rains, the award was thin and allowed bracken to grow. On Bambui farm where burning has been prevented on certain fields for periods varying from three to five years, at altitudes of 5,000 to 7,000 feet, fresh problems reared their head and will have to be overcome. Shrubs, especially *Hypericum spp.* and deep rooted perennials, such as *Lobelia spp.* have appeared and it may be necessary to introduce controlled burning every few years to eradicate them. On the other hand, forty acres of paddock burnt in January have become heavily infested with bracken.

27. At other stations small trials and observation plots of fodders to cut and carry to livestock have continued. A wide need for pastures is unlikely until such time as trypanosomiasis can be controlled and improved methods of mixed farming introduced.

D.—Soil Fertility

28. The problem of maintaining soil fertility in the densely populated areas of the Eastern Provinces is one which continues to receive the closest attention of the Department. Experiments carried out over a period of years have shown clearly that increased yields can be obtained by the use of lime, of artificial fertilisers and, in the acid sand soils, of acioa as bush fallow. Initially, these experiments were confined to the main food crops, yams and the crops commonly planted among yams. Obvious deterioration in yields on the older rice swamps of Ogoja Province have led to investigations into manuring the rice crop and simultaneously it has been considered advisable to test the reaction to fertilisers of jute, a new crop on trial in the region, right from the start. The conduct of experiments to a successful outcome is, however, only half the story. There remains the difficulty of convincing the peasant farmers of the advantages to be secured from these practices. The work of the field staff, many of whom have become in the course of years highly experienced in the technique of extension work, has largely been directed to overcoming this problem and there are gratifying indications that our propaganda work is bearing fruit. Whereas three years ago it was extremely difficult to persuade farmers to allow a demonstration to be laid down on their land, it is now possible to pick and choose the sites for demonstrations. The Provincial Committees of Senior Service Staff have proved an excellent vehicle for obtaining the co-operation in furthering propaganda. This co-operation is demonstrated, in practice, by the provision of transport, and other facilities, where available.

29. *Artificial Manure Demonstrations*.—Details of the results achieved with the artificial manure demonstrations, carried out on the same lines as the previous year, are interesting. In Onitsha Province fertilizers were supplied to 267 plots of which, 211 were recorded. The value of the increments at local market prices on the gross yields of yams adjusted to lbs per acre were :—

<i>Locality</i>	<i>Treated</i>	<i>Control</i>	<i>Increment</i>	<i>Value of Increment</i> £ s d		
Onitsha, North	7,694	5,494	2,200	6	17	0 ³ / ₄
Onitsha, South	7,085	4,508	2,577	10	7	9 ¹ / ₂
Awgu	8,238	5,820	2,418	8	9	8 ¹ / ₂
Awka	6,497	3,864	2,633	11	5	1
Udi	5,621	4,063	1,558	7	16	8
Nsukka	7,103	5,114	1,989	9	5	5
Average for Province.. ..	7,098	4,727	2,371	9	9	6
Less cost of the fertilisers £				4	3	8
Nett profit per acre £				5	5	10

Moreover in the case of intercroops, additional increments were observed which, in some cases were quite substantial. For example the yields of maize were recorded on eighty-eight plots :—

<i>Locality</i>	<i>Yields in lb dry cobs per acre</i>			<i>Value of Increment</i> £ s d		
	<i>Treated</i>	<i>Control</i>	<i>Increment</i>	£	s	d
Onitsha, North	684	366	318	1	6	6
Onitsha, South	1,017	619	398	1	13	2
Awgu	1,198	748	450	1	19	6
Awka	1,386	522	864	3	12	1
Udi	640	540	100	0	9	2

Valuable increments were also accorded for Melon (egusi) and Yam bean (odudu). The dressing of 10 cwts per acre of burnt lime, spread prior to the application of fertilizers, is not considered economical as the evidence of its effect on yams alone is conflicting. But it undoubtedly benefits intercroops, especially maize. The present price of burnt lime manufactured at Awgu is £4 11s 2d per ton and the average cost throughout Onitsha Province delivered to farmers is about £8 per ton or £4 for a dressing of 10 cwt per acre. Its effect may be considered to last over a number of years : it will be observed, therefore, that a substantial part of the cost of the lime is met by the increment of the maize crop alone in the first year of application. The average yam increment obtained would indicate that by using fertilisers, farmers need cultivate one-third less farm land than without fertilisers, thus allowing the land to remain a longer period under bush fallow.

30. The value of increments from recorded plots was assessed by the company of farmers present at each plot harvest. These assessments were generally below current market price ; that for yams averages £8 19s 0d per ton for the Province ; maize value is approximately 1d per lb of dry cobs or three cobs for 1d. Plot harvests were generally well attended and at least thirty photographs were taken of the company present as a background to the actual yield and increment. A demand for copies of these photographs has been general.

31. In Ogoja Province, yield increases as the result of artificial applications have not been so good. Here the soil is better than in other Provinces and other factors such as the hardness of the sub-soil have an adverse effect on the response to manures. It is, however, in Owerri and Onitsha Provinces that the pressure of population is greatest and it is, therefore, gratifying to report the extremely satisfactory results being obtained in the areas. In Owerri Province the average increase in yield was 60 per cent and slightly less in Calabar Province.

32. It is not possible with the limited staff available for propaganda to reach all farmers simultaneously ; work is, therefore, being concentrated for the present in selected areas of Onitsha and Owerri Provinces. The forecast that some farmers would in all probability purchase fertilisers has proved correct, in particular in Onitsha Province where many of the 1950 demonstrations were quite spectacular. Over 300 farmers have come forward in that Province and are paying the full price, many of them depositing cash well in advance of delivery.

33. *Rice*.—Fertiliser demonstration plots for rice were laid down in Ogoja and Onitsha Provinces using the same standard mixture as for yams. Average increases were 808 lbs in Onitsha. In Afikpo Division they ranged from 300 lbs to 800 lbs paddy per acre.

34. *Experiments with Artificial Manures*.—In addition to demonstration plots, eight N.P.K. factorial experiments were laid down on farmers' land in areas selected to give a wide range of soil conditions. These are designed to determine the optimum level of artificial manuring for yams and are a continuation of the series begun a short while ago. The results of these experiments will appear in due course in the report of the Senior Agricultural Chemist.

35. Three twenty-seven-plot factorial experiments on swamp rice manuring were carried out in Ogoja Province. The rates of fertilisers used were :—

N — 0, 1, 2 cwt per acre of Sulphate of Ammonia ;

P — 0, $1\frac{1}{2}$, 3 cwt per acre of 18 per cent Superphosphate ;

K — 0, $\frac{1}{2}$, 1 cwt per acre of Muriate of Potash.

The results have been rather inconclusive but there are indications of a response to phosphate at Iboko where the general yield was 1,404 lbs paddy per acre, confirming the previous year's experience, to potash on the Provincial farm itself and to sulphate of ammonia on good swamp land at Igbo, where the general yield was 2,940 lbs paddy per acre. Further trials will be necessary as experience has shown that the technique of experimentation under special conditions prevailing in Ogoja Province is capable of improvement.

36. Preliminary observations on jute show that heavy manuring is necessary. Experiments are, therefore, being laid down in Onitsha Province. At Umuahia, trials of Cassava manured with Sulphate of Ammonia have been started.

37. *Compost*.—The night-soil compost battery at Enugu has been considerably enlarged and it is noteworthy that the product is now being purchased by Africans. Besides Aba, a battery has been established at Calabar but, as is only to be expected, some time elapses before the operators learn to carry out the correct methods of manufacture without constant supervision. At Umuahia, a modified version of an East African method (East African Journal of Agriculture, Volume XIV, No. 2 of October 1948) was used successfully in treating pure night-soil. The compost was prepared without smell or fly breeding and was ready three months from the start of the operation.

38. After the first turning of the prototype it was decided to start composting on a large scale. The waste pulp from the U.A.C. fruit juice factory at Umuahia—amounting to some ten tons weekly—is being successfully composted. This ingredient has the advantage of keeping the rest of the material moist. At present there is sufficient material to supply some 90 to 100 tons of finished compost. Night-soil, dung and waste from the labour lines is incorporated and arrangements have been made to collect the dung from the twice-weekly cattle trains at Umuahia. Labour is being kept as low as possible and costs are kept with a view to publishing cost per ton. It is interesting to note that the night-soil prototype cost in the vicinity of 10s per ton.

39. *Oil Palm Industry*.—For the third year in succession the exports of graded palm oil produce from the Eastern Provinces have been maintained at a high level, as the following table shows:—

Year			Palm Oil	Palm Kernel
1948	..	..	141,196 tons	179,199 tons
1949	..	..	144,276 tons	175,734 tons
1950	..	..	144,187 tons	177,855 tons

8,199 tons of palm oil were railed to the Northern Provinces compared with 7,128 tons in 1949. It is probable that the high prices paid for oil and kernels and the increased availability of consumer goods have been mainly responsible but there are indications that the increasing numbers of hand presses working and the operation of more Pioneer Oil Mills are having their effect on both the quantity and quality of palm oil produced. The introduction at the beginning of the year of the purchase of a new grade of "edible" palm oil with a free fatty acid content of less than $4\frac{1}{2}$ per cent is a most significant and encouraging event. Purchases of this grade of oil during the year have not been great but it is confidently expected that the production will increase considerably in the future. Equally significant is the decision of the Oil Palm Produce Marketing Board not to purchase Grade V oil as from the beginning of 1951. Everything points to the fact that there has been a gratifying improvement in the quality of Nigerian palm oil in recent years.

40. *Oil Palm Cultivation*.—The allocation of seed to the Region by the Oil Palm Research Station was greatly increased, 500,000 *controlled-pollinated* seed and 80,000 open-pollinated seed being received into the germinators, compared with 390,000 *controlled-pollinated* seed in 1949. This is expected to be more than sufficient for all requirements for planting in 1952, including the requirements of schemes for palm plantations to be managed by the Eastern Regional Production Development Board. The policy is to fulfil the requirements of the Board first and then to supply the remainder of the *control-pollinated* seedlings to farmers. A reserve of open-pollinated, seed, the quality of which is not guaranteed to be of same standard as *control-pollinated* is kept in reserve. New steam heated germinators as employed at the Oil Palm

Research Station are being constructed to replace the older methods but even so excellent results have been achieved at Umuahia and Abak. Dressings of artificial fertilisers applied to palm seedlings after transfer from the trays to the nursery beds have been found to assist in giving an excellent degree of establishment. 48,300 palm seedlings, equivalent to 805 acres (including 220 acres at the B.C.C. Scheme) were distributed. Many of these are planted a few at a time in compounds in areas where the pressure on the land is too great to permit of extensive individually-owned plantations.

41. *Oil Palm Machinery*.—Supplies of palm oil presses were greatly improved and it is thought that nearly 2,000 presses have now been distributed as shown in the following table :—

Province	Palm Oil Presses			Nut Crackers		
	Number Serviceable	Number Damaged	Total	Number Serviceable	Number Damaged	Total
Ogoja ..	14	—	14	2	2	4
Owerri ..	860	20	880	9	7	16
Rivers ..	42	1	43	6	2	8
Calabar ..	356	101	457	12	17	29
Onitsha ...	499	30	529	11	9	20
Total ..	1,771	152	1,923	40	37	77

Though waiting lists are long, the prospective buyers are not taking full advantage of the improved position and it is thought that saturation point is being realised in some districts. The Eastern Regional Production Development Board's Pioneer Mill programme affords strong competition to hand presses, but as there are only a limited number of sites suitable for these mills, there should still be room for presses in the palm oil economy.

42. *Oil Palm Research Station*.—Accelerated progress has been made in opening up the Oil Palm Research Substation at Abak, which is being established for the conduct of cultural experiments and progeny trials under the conditions of the main palm belt. Half the area is good palm grove and is suitable for providing sorely needed information about the performance of wild trees. The survey of wild palms at Nung Udoe was continued and the average yield of bunches per palm, 32.9 lbs, closely accorded with the yield secured the previous year, *i.e.*, 31.04 lbs; again the yield was lower than one would ordinarily expect.

E.—Other Crops

43. *Linseed*.—This crop which is grown at Bambui farm requires a high elevation and rich soil. The varieties Canadian Royal and the Nughen strains produced much the same yield and it was found that planting early in September was advisable. Owing to the density of stands sowing in drills on the flat in broad terraces does not contribute to erosion.

44. *Potatoes*.—Bliss Triumph is proving the best variety for Bamenda which has been tried so far and it is being multiplied for distribution.

45. *Coffee*.—The total area under Arabica coffee in Bamenda has risen from 565 acres to about 800 acres. Much of the planting is done in the form of small compound plots as local inheritance laws do not make it easy for individuals to plant large acreages. The high prices offered by middlemen operating in the coffee areas provide a stimulus to planting. The Robusta variety grown in the Tombel-Nyasoso district of Kumba Division now amounts to 3,000 acres. Old plots are being brought back into cultivation and the crop is estimated at 200 tons compared with forty tons of Arabica. A central hulling plant is being erected at Bamenda, a loan from the Eastern Regional Development Board having been obtained for the building.

46. *Fibres*.—Small scale trials have been continued with jute, mainly with the object of multiplying seed. Results indicate that the best growth is obtained in heavy soils with good humus content and adequate water. Growth is not as good as the best growth reported from India but under good conditions, plants of five to six feet at flowering time have been obtained. A mill trial with *Clappertonia ficifolia* fibre from Calabar which was undertaken in Dundee during the year did not fulfill the early promise of this fibre and it is unlikely that it will prove to be a complete substitute for jute. Trials with ramie fibre (*Boehmeria nivea*) have been undertaken at Bamenda and Mamfe and samples prepared. *Urena lobata* has not been a success there so far.

47. *Tea*.—Plants raised from seed obtained from Buea have made good growth at Bamenda. They were planted at levels between 4,500 and 6,000 feet.

48. *Kola*.—An interesting feature of the kola trade in Bamenda is that the nuts are derived from the species which agrees with description of *Cola verticillata*. The species *C. nitida* and *C. acuminata* are the varieties commonly seen on the market elsewhere in Nigeria.

49. *Nurseries*.—Over 5,000 citrus, 1,800 kola, 11,000 coffee and 1,700 other plants were distributed from the Departmental nurseries during the year.

50. *Loofah*.—As a result of enquiries from the Colonial Office investigations into loofah culture were begun. In the past loofahs have been grown for local use on a very small scale but collation of information shows that more care and attention than is commonly given them is necessary to produce the best grades. Some local strains have grown to a good length but further selection is necessary to obtain the breadth and fineness of texture which the market demands.

51. *Hevea Rubber*.—In view of the renewed interest in the export of rubber, preparations have been made to plant an area at the provincial farm Abak, with the best available material. This will be a demonstration to farmers of correct methods of planting and later of tapping and small scale manufacture. The plot will also enable comparison of various clones to be made and will serve as a source of clonal seed.

52. *Coconuts*.—Certain areas, particularly of Calabar and Rivers Provinces, are admirably suited to coconut cultivation. As a preliminary to further work a small consignment of selected seed of coconuts has been secured from Ceylon and surveys have been made with a view to finding suitable locations for plantations.

53. *Rice*.—There is a general interest in the cultivation of rice which continues to expand and, as a food, it is gaining in popularity. It is thought that the acreage in Ogoja Province has risen to 16,000 acres; expansion is taking place in the Ndeaboh area of Awgu Division of Onitsha Province. The season was not so favourable as the previous year owing to the long period of drought which affected the later plantings. Apart from manurial investigations and demonstrations, attention is being paid to the quality of seed. Plots have been laid down for the multiplication of pure line G79 seed and eleven tons of improved quality have been issued to farmers during the year.

54. Work in the riverain Massagha Swamp which is being opened by hand, is being extended but considerable damage was done to a very promising crop by unusually high floods in September. Such losses must be faced in riverain areas in years of exceptional flood and cannot be prevented without the construction of elaborate levees and sluices, the cost of which is likely to prove uneconomic. The development of this swamp will be continued by the Eastern Regional Production Development Board; this will enable the Department to begin work on promising swamp areas elsewhere with the assistance of machinery. A small scale trial was laid down at a riverain mangrove swamp at Isoba in Rivers Province.

55. *Rice Mills*.—The value of rice mills not only as commercial undertakings but also in stimulating rice cultivation, has now been amply proved. That the mills have been profitable is demonstrated by the following statistics which relate to one season's working at two mills in Ogoja Province:—

	<i>Abakaliki</i>	<i>Okpoha</i>
Paddy milled	335½ tons	265½ tons
Net Profit	£436 14s 3d	£287 12s 10d

These profits represent 55 and 34 per cent respectively on the capital invested. In accordance with agreed policy these two mills have now passed into private ownership. Similarly with the financial assistance of the Eastern Regional Production Development Board other mills will be erected to stimulate production in new areas and sold as soon as they become profitable. Two, however, will be retained under Departmental control for experiment and as a measure of price control, should that prove necessary. A number of persons are purchasing rice machinery from the local agents and erecting it in well-established rice growing centres. Such a one is Abakaliki and it is interesting to observe that paddy grown in the Iyahe area, near Bansara, is by-passing the Departmental mill recently erected to serve that neighbourhood and is being processed at Abakaliki.

56. *Cocoa*.—Cultural work on this crop has been confined chiefly to the establishment of experimental plots at strategic points. If successful these will in time become multiplication plots for selected cocoa and serve as centres for the issue of improved planting material to farmers. Plots have been established at Alankwu, Ikom and Kakwagom, in Ogoja Province, at Bende in Owerri Province, at the B.C.C. Scheme in Calabar Province, at Bakebe in Bamenda Province and at Kumba in the Cameroons Province. The prospects for the extension of cocoa growing in the Region are bright and expansion already is taking place in Ogoja Province. The posting of a Cocoa Survey Officer in the Cameroons Province has led to the collection of valuable data. Special attention has been paid to the improvement of the quality of Cameroons cocoa as complaints have been received of contamination by "hammy" or "smoky" beans, which seriously reduce the value of the crop. This is caused by primitive methods of drying in districts of very high rainfall and it has been possible to trace some of the contamination to its source. Cheap and simple apparatus has been designed to enable farmers to improve their product. 1,222 farms, about one quarter of the total area of cocoa in the Cameroons, have been resurveyed. The total acreage covered has been 12,446 of which 2,097 is owned by the Cameroons Development Corporation. The average acreage owned by African farmers is 8.43, which is much higher than the rest of Nigeria. The observation plot managed by the Department produced 204 lbs of wet cocoa more than the equivalent plot managed by the owner.

57. The export of cocoa from the Cameroons and Eastern Provinces amounted to 3,246 tons as compared with 4,836 tons in 1949 and 2,544 tons in 1948. The fall is accounted for by the poor yield of the Cameroons crop.

F.—Miscellaneous Activities

58. *Agricultural Engineering Branch.*—The erection of the Mechanical Workshop at Abakaliki farm and the delivery of equipment enabled progress to be made with trying out various types of machinery. Much of the Provincial farm was cultivated mechanically on the contour by the Fowler Crawler using a disc plough, harrow and heavy ridger. The land leveller was also used effectively. The Ferguson was used with the mounted ridger, mower and three-ton tipping trailer and was in continuous use for general haulage. The Fowler Crawler with the disc plough and land leveller did satisfactory work at a nearby rice swamp and eventually made long runs of some 450 yards.

59. The results so far have not been an unqualified success and the local system of arable farming is not easily adapted to mechanisation. There are, however, distinct possibilities for the use of machinery in rice cultivation. Even so there are several difficulties to be overcome. Bridges on many roads are incapable of carrying heavy equipment. It is a common practice particularly in Abakaliki Division, to alternate yams with rice. Cultivation for rice consists in breaking down the giant yam hills (Fig. 3); this would have to be done by hand as they form an effective barrier to tractors. Moreover, the expensive operation of stumping is necessary. Preparations are being made for pilot schemes to test the practicability of mechanised rice cultivation on a larger scale than hitherto with the assistance of the Eastern Regional Production Development Board.

60. At Bambui farm, Bamenda, the Fordson Major (Figs. 4 and 5) which was converted from kerosene to petrol was originally fitted with rubber tyres. When the tractor was first used with heavy implements in the dry season, so much wheel slip was experienced in the fine volcanic soil that half-tracks had to be fitted. Performance was better with rubber tyres when light implements only were used on fairly level ground. With the advent of the rains, the half-tracks became coated with mud and would not grip at all. This difficulty was finally overcome satisfactorily by the fitting of lugs. Further difficulties have been met in adjusting machinery to turn in the dense tufts of *Sporobolus* grass. These trials were not advertised for public demonstration but nevertheless drew interested spectators from distant parts of the Province.

61. On provincial farms successful trials have been undertaken with autoscythes and rotary hoes.

62. *Market Gardening.*—The recruitment of an Officer with extensive experience of market gardening in England has made it possible to inaugurate an urban market gardening scheme whereby it is hoped to set up a model market garden at each of the main townships in the region. The pilot market garden in Enugu was started in March. This is being used as a training centre for men who will start other urban market gardens, and also as a source of high grade vegetable seed. One of the most important features of this scheme is the utilisation of night-soil compost. It is gratifying to observe local market gardens adopting improved methods, e.g., contour beds, mulching, composting, as a result of our work. The pilot scheme has not been without its setbacks; serious trouble to the pumping plant occurred at a time when the garden depended entirely on its efficient operation. Market gardens at provincial farms have not been neglected and have achieved a steady output.

63. *Soil Conservation*.—In Onitsha Province, where in certain districts soil erosion can be seen at its worst, a few farmers in the neighbourhood of the provincial farm permitted conservation measures to be demonstrated on their farms. These measures included contouring with instruments and bunding by the Agricultural Department's staff. Further progress is likely when the advantages derived from the large scale measures adopted on Government farms and farm centres begin to fix themselves in the minds of the surrounding farmers. Further work is confined to laying out the bunds, the actual labour being provided by the community. Figure 6 illustrates contour ridging with Elephant grass banks at Bambui farm, Bamenda.

64. *Bamenda-Cross River-Calabar Scheme*.—The scheme was reorganised during the year and part of the main palm plantation was taken over from the Planning Authority by the Eastern Regional Production Development Board to form the Kwa Falls estate, which also includes the Massagha Swamp. The expansion of the palm plantation was much accelerated but all requirements for palm seedlings for immediate planting in 1950 and for nurseries was met. 220 acres were planted during the year, bringing the total to 1,190 acres. Planting was first begun in 1947 and many of the palms are now in bearing. The number of settlers at the main settlement of Aningeje rose to 126 at which figure the settlement is stabilised. The nursery issued a large number of coconuts, kola, avocado pears, cocoa, coffee and mangoes to the settlers. Though the standard of agriculture is not all that could be desired, in spite of the presence of a model holding, one of the main objects of the settlement, namely, to encourage people to settle in an under-developed area, is largely being achieved, judging by the great increase in motor traffic and camp followers.

65. *Botanical and Pathological Work*.—A variety trial of cassava was continued at Umuahia. The promising Gold Coast variety G97 B (Garri) was surpassed by two local varieties which gave $9\frac{1}{4}$ and $8\frac{1}{2}$ tons of roots per acre. The testing of cowpeas was also continued. The Pathologist made some detailed investigations into the incidence of black-pod disease and suspected virus of cocoa in the Cameroons. The Senior Botanist was able to supply material for the T38 cocoa plots and use was made of the internal air services for the rapid distribution of the seed.

66. *Entomological Work*.—An Entomologist was posted to Umuahia for part of the year before being called away for anti-locust duties. He concentrated on investigations into the Yam Beetle and included a pest survey, including tsetse, in its programme of work.

67. *Chemical Work*.—The main work of the Chemical Section was directed to factorial experiments in the use of artificial fertiliser on yams and intercrops.

APPENDIX I

RAINFALL FIGURES : EASTERN REGION, 1950

Month	ABAKALI			UMUDIKE			UYO, CALABAR			NKWULIE, ONITSHA			BAMBUL, BAMBENDA		
	No. of Rainy Days	Rainfall in ins.	Previous Average for 36 Years	No. of Rainy Days	Rainfall in ins.	Previous Average for 16 Years	No. of Rainy Days	Rainfall in ins.	Previous Average for 14 Years	No. of Rainy Days	Rainfall in ins.	Previous Average for 18 Years	No. of Rainy Days	Rainfall in ins.	Previous Average for 5 Years
January	4	3.18	0.6	4	0.91	0.9	3	0.64	1.5	2	0.75	0.5	1	1.00	0.75
February	1	0.30	1.2	3	0.27	2.0	2	0.23	3.5	1	0.20	1.2	2	0.53	1.10
March	4	3.87	3.3	7	2.50	4.5	7	4.76	5.8	3	2.71	2.2	6	2.82	2.30
April	8	4.54	5.8	9	3.59	8.1	10	11.66	8.6	10	4.58	6.0	20	6.10	8.25
May	13	7.81	9.8	22	8.88	10.3	12	9.84	10.9	16	11.76	8.6	22	10.26	9.01
June	20	16.74	10.9	21	5.52	12.3	14	9.76	10.5	14	9.40	9.7	25	10.21	11.48
July	19	14.70	11.0	22	12.30	11.5	13	14.55	12.1	13	11.42	10.8	27	11.58	15.92
August	18	7.65	10.5	21	6.49	10.4	18	10.40	10.4	10	4.30	8.5	25	13.61	12.60
September	19	9.23	14.4	26	12.25	13.4	20	11.97	14.3	19	8.46	11.8	30	26.13	18.37
October	14	16.52	12.2	22	8.34	11.3	24	12.45	12.4	16	8.80	9.7	23	11.78	11.19
November	3	0.72	2.1	7	1.96	34	7	7.85	6.2	3	2.28	2.2	4	1.06	1.96
December	—	—	0.5	—	—	0.8	—	—	1.9	—	—	0.5	—	—	0.92
Total	123	85.26	82.3	164	63.01	88.9	130	94.11	98.1	107	64.66	71.7	195	95.08	93.85
Average for month		7.10			5.25			7.84			5.38			7.92	

RESEARCH IN THE EASTERN PROVINCES

A.—Introduction

1. As no facilities for research exist in the Eastern Provinces, the work is initiated and controlled by the officers stationed at Ibadan. Laboratories have however been planned and should be ready for use next year.

2. The Chemistry Section has been investigating the fertiliser requirements of the soils while the Entomology Section has been investigating possible control measures to reduce the loss caused by the yam beetle. The Botany Section has been mainly concerned with the trials in the Region of improved varieties of the local food crops.

B.—Botany Section

3. The most pressing need for botanical work in the Eastern Provinces continued to be in connection with food crops. Collections of local and introduced varieties of cassava, yams, cowpeas and miscellaneous legumes were maintained for future study.

4. *Cassava*.—High yields were obtained in a trial of twenty varieties of cassava despite severe infection with mosaic disease, the best being Karagba at fifteen tons per acre and GC997B at twelve tons per acre. Other varieties which were equally high yielding included U4 and U6. There were no statistically significant differences between these four varieties in order of merit.

5. *Citrus*.—Preliminary budding work was carried out in anticipation of future requirements for rootstock and varietal trials. Supplies of other fruit trees were also maintained in the nursery.

6. *Other Crops*.—Brazilian Lucerne, *Stylosanthes gracilis*, appears to have potential value as a fodder crop. Supplies were accordingly multiplied to provide material for extensive trials throughout the Eastern Provinces.

C.—Chemistry Section

SOIL SURVEYS

7. A field examination of the soils of the Experiment Station, Abakaliki, was begun during a brief visit of the Chemist, but there was not time to complete this.

FIELD EXPERIMENTS

8. *Fertiliser Experiments*.—Factorial experiments on the application of N.P. and K. at three levels were laid down on yams and rice in the Eastern Provinces.

9. The experiments on yams, ten in number were distributed throughout the Eastern Provinces. The experiments have not been statistically analysed and it is doubtful if significant results will be obtained in the majority of the trials due to the extreme plot variability. A definite response to the application of Nitrogen throughout the Eastern Provinces is apparent. In case of phosphate and potash applications the general response this year is negligible, the response to phosphate is most marked at Isieke and Obohia, and likewise for potash at Obohia, Isoba and Umogi.

10. The rice experiments consisted of three N.P.K. level factorials and one five by five latin square and were all sited in Ogoja Province. The experiments were unfortunately disturbed with damage due to rodent activity. The effects of phosphate application at high levels was quite marked in the Abakaliki area and supports a similar trend found in 1949. There was some indication that the application of nitrogen induces increased tillering of rice. Similar experiments on rice are to be conducted in 1951.

LABORATORY WORK

11. Samples examined in the Ibadan laboratory included fertilisers, leaves and ash of *Acioa*, and composts made by various processes at Abakaliki. Various old soil samples were dealt with.

12. Twenty-seven topsoil samples collected in the Agricultural survey of a large part of Rivers Province by an Assistant Agricultural Officer were analysed. These were interesting because practically no soil samples from that region of Nigeria had been received previously; all the samples were from the river alluvium of the Niger Delta. Most of the samples were from dry-land soils, and these had pH values of 4.3 to 5.3, 14 to 26 per cent clay, 8 to 22 per cent silt, 51 to 74 per cent fine sand, and under 2 per cent coarse sand (except for three samples with more coarse sand). A Senior Agricultural Officer who has visited the area remarks "Excellent crops are grown on these soils and they appear to be rich, but they are not cropped a great deal and have a long resting period under the local system of cultivation." It seems likely that all these soils could be made impervious by puddling, and that swamp rice could be grown on rainfall only (about 100 to 160 inches), without irrigation. Two samples were from freshwater swamps (with oil palms and raphia palms); these were silty clays (1 per cent coarse sand, 43 per cent fine sand 28 per cent silt 28 per cent clay) of pH 4.7. There were also four samples of silty clays (pH 4.3 to 6.3) from land flooded annually, which, with the clayey freshwater-swamp land should evidently form very good rice land. These soils therefore merit further investigation in the field when time permits.

D.—Entomology Section

YAM BEETLES

13. Two species of *Heteroligus* and *Prionoryctes caniculus* are known to attack yams; it appears that damage may be caused both by the adult and larval stages. The greatest damage occurs in the Eastern Provinces and at Kwale in the West. From April to December, Mr Gregory studied the life history and biology of the pests and attempted to devise control measures.

14. The degree of attack varies greatly in different localities, and laboratory tests demonstrate that adults cause more damage than larvae. As larvae have not yet been described they are difficult to identify. So far, only the larva of *Heteroligus appius* has been recognised. These are common in the top six inches of soil under *Acioa* and oil bean bush where they feed upon the roots. They pupate in similar situations between May and June remaining fourteen to fifteen days in the pupal stage. The habits of the larvae of *H. claudius* are probably similar.

15. Several control measures have been tried including applications of DDT and BHC to the soil heaps, a top dressing of palm fibre (in the hope of attracting ants to destroy the larvae), and seed dressing; containing DDT and BHC. The use of oil palm fibre mulch increased the yield of yams, sometimes considerably, but also increased the attack. Thus, at Ekwulobia, an increased yield of 69 per cent was obtained although damage increased by 63 per cent. It therefore appears that a severe attack of the pest may not greatly decrease the yield of yams, and this is confirmed by the results of experiments using BHC as a seed dressing. Although this treatment reduced the attack by 75 per cent an increased yield of only 5 per cent was obtained. From other figures, it has been calculated that a complete control of the pest in the Ogoni area, would give an increased yield of only 8.3 per cent. In this case it is unlikely that insecticidal control will be economical.

16. In addition, some evidence was obtained that BHC imparts a characteristic taste to the tubers making them unpalatable. This however, was not always confined to the treated plots and suggests a "creeping" effect. It is intended to repeat the experiments using a de-odorised gammexane product.

17. Vague reports of a variety of yam resistant to the attacks of these pests have been received. Unfortunately the variety does not appear to be good in any other respect. It is tough throughout and the top third is bitter; the roots have spines which make it difficult to weed. The possibility of breeding for resistance whilst improving the quality of this tuber should be considered.

REPORT OF THE COCOA DIVISION, AGRICULTURAL DEPARTMENT

A.—Nigerian Cocoa Survey

Re-survey of Farms.—Steady progress has been maintained in the Provinces and no new outbreaks of Swollen Shoot have been reported outside the Ibadan Division of Oyo Province. The block survey system used in the Ibadan Division has now been adopted throughout the Western Provinces as it has been found to be a more efficient method of detecting Swollen Shoot disease. It differs from the old method in that Cocoa Survey Assistants work in groups instead of individually. Farms are not only inspected more efficiently but the work is expedited and much more thorough supervision can be maintained with the working parties in the field by supervisory staff. The appearance of field staff in groups caused some apprehension in a few villages at first, but no serious opposition has been encountered. The re-survey is conducted on a village to village basis and as each village is completed, a detailed assessment of the cocoa is made with special reference to the general condition of the farms, the incidence of pests and diseases, and the extent of new plantings.

2. *New Plantings.*—Since the commencement of the re-survey in February 1949, some 2,000 acres of new plantings have been recorded but the earlier returns did not include new plantings in Ibadan Division. This area is now being included and from the first reports that have been received, re-planting activities outside the area of mass infection seem greater than was supposed. Owing to intensified dry season conditions which has been one of the most significant climatic changes which has occurred in the past decade, farmers are experiencing great difficulty in establishing cocoa successfully except on the best soils and in areas where rainfall is more favourable.

3. *Observation Plots.*—The number of Observation Plots has recently been reduced to enable Provincial Cocoa Survey Officers to give a greater degree of supervision. These plots are proving to be of great value in providing information on the economics of cocoa production and the methods of management employed by peasant farmers. A recent analysis of records obtained from both Departmental plots and Farmers' plots has led to the following conclusions :—

- (a) Yields per tree on plots managed by the Department are generally greater than on farmers' plots. This is not because the trees give a higher yield on Departmental plots, but because the farmer does not harvest all the pods on his trees.
- (b) The percentage of pods affected by Black Pod disease is higher on plots managed by farmers.
- (c) Profit per tree is generally greater on plots managed by the Department.

- (d) Where casual labour is employed, the amount of work undertaken on a cocoa farm is determined by the relative value of the cocoa crop and the cost of labour. For this reason, selected times for harvesting is more profitable than fixed regular three-weekly harvestings when labour costs are high, even though this may involve a certain loss of crop.
- (e) Casual labour is at present too expensive for a small farmer to employ for regular harvesting. It does not appear to become economic until the size of the holding is more than $3\frac{1}{2}$ acres in extent. On the majority of the farms in the Western Provinces, the greatest net gains to farmers are likely to be obtained from the minimum employment of paid labour and the maximum use of family labour.
- (f) There are certain circumstances in which the Departmental method of three-weekly harvesting and control of Black Pod disease are uneconomic. Contributing causes are :—
 - (i) Exceptionally unfavourable weather conditions during July and August.
 - (ii) In certain localities there is, for various reasons, an abnormally high incidence of Black Pod disease.

B.—Swollen Shoot Disease

4. *Sealing off Policy.*—In February 1950, an assessment of Swollen Shoot disease problems in the Ibadan Division of the Western Provinces was prepared by the Deputy Director of Agriculture (Cocoa). The review concluded that in areas where the initial infection was high, as was the case in parts of Ibadan Division, the cutting out policy had failed to bring the disease under control and that no useful purpose would be served by continuing the campaign where it had reached epidemic proportions. It was emphasised that it was of primary importance that the disease should be confined and prevented from spreading into healthy cocoa areas, and as an alternative to the mass cutting of infected trees it was recommended that a policy of sealing off the area of high infection should be adopted by the creation of a special protective belt or “cordon sanitaire”. This policy was put into effect in July 1950 and has recently been reviewed in considerable detail. During the period which has elapsed since this new method of control has been in operation, intensive surveys have been undertaken and some attempt has been made to clarify future policy with particular reference to the following points :—

- (a) The delineation of the area of mass infection where the disease is so widespread that the application of the cutting out policy for the time being is considered to be ineffective from the point of view of controlling the disease.
- (b) The determination of the position and extent of the “cordon sanitaire” or protective belt and measures to be adopted for disease control within this area.
- (c) The policy to be followed inside the area of mass infection where the cutting out policy for the time being has been suspended.

5. (a) *The Limits of the area of Mass Infection.*—The territory around Ibadan has been divided into areas, with clearly defined boundaries of roads, rivers, or railways, each area in turn being sub-divided into sections to facilitate the work of the survey parties working in farms. An appreciation of the condition of cocoa in each of these areas and of the relative importance of all foci of infection in relation to the policy of sealing off the area of mass infection has been made. It is now possible to demarcate the approximate position of the limits of the area in which it is considered for the time being that cutting out policy has no application. The area involved is estimated to be

about 497,000 acres in extent. Not all of it is planted with cocoa; the density of planting varies from 5 per cent to 60 per cent. It is computed that in some of the more densely planted sections more than 30 per cent of the cocoa trees are infected and in other parts active foci of infection are so numerous as to make effective treatment impracticable. Where the extent of infection is of this order, treatment by cutting out involves the eventual removal of all the cocoa trees.

Although the whole of the territory demarcated in this way, must, for the time being, be regarded as an area of mass infection, part of it is believed to be less heavily infected than the remainder. This portion is now being re-surveyed in detail. Should results reveal that this section is capable of treatment by cutting out, this portion will be excised from the area of mass infection and regarded and treated as forming part of the "Cordon Sanitaire".

6. (b) *The position and extent of the "Cordon Sanitaire" and measures to be adopted within this area.* (i) *Defence.*—Outside the area of mass infection, a strip of territory has been demarcated around its perimeter which has been designated the "Cordon Sanitaire" or protective belt. It varies in depth according to the incidence of Swollen Shoot disease, the density of cocoa, and the extent of healthy cocoa areas on its extremities. On the northern boundary of the area of mass infection, there is no protective belt as this section borders on Savannah Woodland Country which marks the limit of cocoa cultivation. The eastern boundary adjoins extensive areas of healthy cocoa which are contiguous with the main cocoa producing areas of Ife and Ondo. This is regarded as the most critical defence frontier which must be patrolled in great depth in order to ensure that the disease does not infiltrate into the eastern cocoa producing areas of the Western Provinces. Within the "Cordon Sanitaire", special cocoa survey teams visit and inspect every cocoa farm once in six months. If any outbreaks of swollen shoot are discovered, all trees deemed to be infected are removed and the farms are subject to re-inspection and re-treatment at intervals of not less than three months.

(ii) *Attack.*—In addition to maintaining a close surveillance of the protective belt in this manner, it is important that the area of mass infection shall be attacked wherever practicable. A close six-monthly inspection is therefore maintained inside the perimeter of the area of mass infection to a depth of one mile and any foci of infection considered to be controllable are treated in the same manner as those occurring in the protective belt itself. This method is regarded as the best means of attack on the diseased area and if successfully prosecuted in this way, it should be possible to advance inwards and steadily reduce the extent of the heavily infected area.

7. (c) *Policy inside the area of mass infection. Reconnaissance Survey.*—Within the area demarcated as the area of mass infection, the general condition of the cocoa farms and the progress of Swollen Shoot disease will be kept under continuous review. Although the main centres of infection and their satellite foci have been determined, it is not possible at this stage to hazard a guess as to the rate of mortality or decline in production. The area contains a high percentage of old cocoa and many farms are on the decline as a result of old age, neglect, capsid damage, marginal soils, etc. Periodic surveys therefore will be undertaken to determine the progress of the disease together with other changes which are taking place as new plantings and losses from causes other than Swollen Shoot disease.

8. *Conclusions.*—It is premature to make any pronouncement regarding the effectiveness of the sealing off policy. All that can be said after the first six months of its application, is, that the general position has not deteriorated.

C.—Rehabilitation and Development

9. *Swollen Shoot Areas.*—It is fully realised that the replanting of cocoa within the infected area is fraught with risks, nevertheless, farmers must be taught to live with Swollen Shoot disease since its total eradication may not be achieved. Re-planting will therefore be subject to such safeguards as may be considered necessary and it is hoped to introduce a subsidy scheme which will assist farmers to rehabilitate their farms in an orderly manner and under circumstances which will provide optimum conditions for disease control.

10. Some decline in production in the area of high infection must be anticipated in the immediate future but it is computed that approximately one-third of the area contains soils which are suitable for rehabilitation with cocoa. If these can be planted with higher yielding strains under improved standards of maintenance this together with plantings in new areas should go a long way towards making good losses sustained by Swollen Shoot disease.

11. Experimental plantings of cocoa within the area of mass infection are now being undertaken by the Rehabilitation Section of the Cocoa Division and as soon as the Soil Survey of the area has been completed a comprehensive plan for the area as a whole based on soil types can be prepared.

12. *Maintenance of Economy of Diseased Areas.*—It is a matter of considerable importance that the economy of the diseased areas should be maintained or if possible improved. On marginal soils, it is known that there is little likelihood of successful rehabilitation with cocoa. Other economic crops must therefore be offered. Such a policy has already been agreed upon by the Western Regional Production Development Board which is participating in rehabilitation schemes for the area. A Pioneer Oil Mill has recently been erected by the Board at Asejire and is now so popular with farmers that it is working two shifts a day. In addition, the establishment of a Citrus processing plant has also been approved.

13. *Nursery Work.*—Nurseries have been established at Moor Plantation and at Asejire for the production of cocoa, citrus, oil palms, kola and coconuts in order that farmers may have the widest choice of alternative crops. Some 14,000 controlled pollinated oil palm plants are now available for planting of farms and a further 60,000 seedlings have been germinated during the past six months which will be planted in the nurseries this year in preparation for next year's planting season.

In addition 20,000 citrus stocks are ready for budding this year and 30,000 more will be established during the next few months.

14. *Future Problems.*—The disaster of Swollen Shoot disease should have brought home to all concerned with the economy of the Western Region and the welfare of farmers in particular, the weaknesses of existing methods of crop production, particularly as regards the impracticability of effecting efficient control of major diseases and pests. Swollen Shoot disease has attracted attention and called for special measures for control because it is known to be a killer and its presence is a constant threat to the industry. It is not always appreciated that actual losses of crop due to Swollen Shoot disease at present are small in comparison with the damage sustained annually from capsid attack and Black Pod disease.

15. In planning for the future every effort must be made to avoid a repetition of the worst features of the present economy by introducing improved standards of husbandry at all stages of crop production. For the most effective assistance to be provided by the Department of Agriculture, the primary pre-requisite is improved accessibility

to the farms. This must inevitably involve larger units of production. As a first step, it is thought that this can be best achieved by the formation of Co-operative producers societies, which, if properly constituted would be eligible for financial assistance by grants-in-aid or development loans from the Western Regional Production Development Board. The assistance of the Co-operative Department has already been enlisted and an active approach is being made by inviting farmers to aggregate their holdings into larger units for orderly development on a co-operative basis.

16. In addition, the Cocoa Division is working in close association with the Western Regional Production Development Board in the development of the new Ijebu-Igbo Project where it is known there are considerable areas of land suitable for the cultivation of cocoa, citrus and oil palms. Plantations of these crops will be started in 1951 and the provision of improved planting material will be made available for the project as and when required.

D.—Improvement of Quality of Cocoa

17. The grading figures for the Western Provinces excluding the Colony have again shown a further improvement in quality. Figures for the season April 1950 to March 1951, are as follows:—

Grade I	..	..	..	..	..	..	97.3 per cent
Grade II	..	..	..	..	..	..	2.7 per cent
Tonnage graded	..	..	..	..	..	..	102,992 tons

18. This is a very satisfactory achievement indeed and reflects great credit on the combined efforts of the Department of Marketing and Exports, the Cocoa Division of the Agricultural Department, and the Administration Department working in collaboration with local Authorities. Although the situation leaves little room for further improvement, efforts must not be relaxed, otherwise there will always be a risk that the situation may deteriorate. Greater emphasis in future will be directed towards more thorough fermentation as there has been some criticism recently from the manufacturers in the United Kingdom that the percentage of purple beans in some parcels of cocoa has been unduly high.

E.—Cocoa Soil Survey

19. The scheme for carrying out Soil Surveys of the existing and potential cocoa areas of the Western Provinces, for which financial provision was made in 1948, has now been put into effect. After the recruitment and training of field staff, it was possible to begin work in March. The present plan of work which is being adopted, aims at carrying out two types of soil surveys in the following manner:—

- (a) *Rapid General Surveys* to cover the whole of the cocoa belt (divided into eight to twelve convenient sections) in which the soils will be classified, the mapping units defined, and each soil described in some detail and its suitability for cocoa or other crops assessed; the land will be roughly mapped in Soil Associations on the scale 1/125,000 (approximately ½ inch to one mile).
- (b) *Semi-detailed surveys* of special areas (up to fifty square miles) following the general Soil Surveys of the larger areas or sections in which these special areas occur. In these areas the boundaries of the individual soils will be mapped on the scale 4 inches to 1 mile.

20. Two Senior Officers have now been appointed to the Soil Survey. An Assistant Agricultural Officer has been transferred to this work, and twelve young Assistants (Temporary Field Overseers) were selected and their training begun in the middle of March 1951. The area which is being surveyed first is the south-eastern part of Ibadan Division, which consists of the land bounded by the Omi River on the west and the Shasha River on the east. This includes the greater part of the area affected by Swollen Shoot.

F.—Cocoa Agronomy

21. *Cocoa Propagation*.—The propagation of cocoa cuttings was discontinued during the dry season months owing to the difficulty of obtaining materials in a suitable condition for rooting. Moreover, cuttings rooted after September will not make sufficient growth for planting out in the field the following May. All propagation of clonal material will therefore be confined to the months of April to September.

Experiments have been carried out by the Cocoa Agronomist at the Moor Plantation Propagation centre with single leaf cuttings. The advantage of this method over stem cuttings is that a much larger number of plants can be raised from a given quantity of material. This is a matter of considerable importance when parent plants are in short supply. Investigations are also in progress to test out different kinds of rooting media. In the sprinkler propagator which was in use last wet season the cuttings were rooted in pure sand but some difficulty was experienced in potting out the young plant in soil. In the new techniques which is being tested, transplanting losses are being reduced by using a mixture of sand and fibre. This medium is very retentive of moisture and the leaf cuttings require to be watered not more than twice a week—a point of very considerable importance where the quantity of water available is very limited. With the new technique it should be possible to establish clonal propagation centres at any convenient point in cocoa areas where rehabilitation or new plantings are being undertaken.

22. *Botanical Work*.—Cocoa plots under the management of the Botanical Section at Agodi, I. N. A. and Moor Plantation are making good progress. Watering experiments to determine the minimum quantity and frequency of watering which are necessary to reduce losses to a minimum during the first dry season, have been carried out. Excellent results have been obtained from the application of one gallon of water per plant per week.

Seeds from selected high yielding trees at Agodi have been planted in baskets for establishment at the Ijebu-Igbo Estate. Approximately 15,000 basket plants are available for planting this season.

23. *Black Pod Disease*.—During the past twelve months the Plant Pathologist has made a study of the fungus which causes Black Pod disease, together with circumstances which favour its natural spread and conditions necessary for infection. In addition, certain investigations have been made with fungicide sprays and other methods of controlling the disease. A report has recently been submitted on this work and the following conclusions have been reached.—

- (a) Fungicide spraying can reduce the number of Black Pods and thereby increase the yield of cocoa, but when the general level of yield per tree is low, fungicide spraying may not be remunerative.
- (b) Where control by the removal of diseased pods is employed, the most effective results are obtained if diseased pods are removed as often as every other day.

Wind dispersal is an important factor in the spread of Black Pod disease and it may be futile to attempt to control the disease by removal of infected pods in a small area adjacent to cocoa where no control methods are taken. Unless a small farm is sufficiently isolated from other properties, Black Pod control must be undertaken on neighbouring farms also in order to be effective. Owing to the scattered manner in which cocoa is planted and the lack of accessibility to the farms, control of the disease by fungicides has a very limited application, and again frequent harvesting of infected pods is limited by the cost of labour. In the light of present knowledge therefore it is considered that a widespread adoption of the practices demonstrated on the Observation Plots, would, within the limits of weather conditions considerably reduce the loss of crop due to Black Pod disease.

REPORT OF THE SCHOOLS OF AGRICULTURE

A.—Ibadan

COURSES

1. The only major change in the courses of training given during the year has been the institution of a Field Overseer Course. This consists of forty-four weeks of training. In alternate weeks students are engaged wholly on practical work. In other alternate weeks, time is divided between one-third practical work and two-thirds classroom work. Entrants are of Secondary II pass or higher. There are thirty-one students, divided between Eastern and Western Regions. Five Native Authority trainees are among the sixteen from the Western Region.

2. The two-and-half-year course for Agricultural Assistants continued. The period under review included the first full six months of solely practical training for Agricultural Assistants. It is gratifying to record that the institution of this practical work session has not resulted in any increase in resignation as was at first expected.

3. The Assistant Agricultural Officer training courses will come to an end in December 1951. Only one class therefore remains in the School. There were originally five students in this final year of the course but two were awarded scholarships to the University College, Ibadan and one was invalided out of the service leaving only two to complete the course.

4. *Women Agricultural Assistants.*—Two women students were taken into the 1951 class of Agricultural Assistants. This makes a total of five women in training at present. It is very satisfactory that these women have shown themselves well able to deal with the practical side of the course and have maintained their interest in Agricultural work.

5. *Numbers of Students.*—The following figures show the intake, losses and output of students during the period under review :—

	Agricultural Assistants entered School			Assistant Agricultural Officers entered School		Field Overseers entered School	Totals
	January 1951	January 1950	January 1949	Janu- ary 1949	Janu- ary 1950	January 1951	
Already in School March 1950	—	36†	23†	6	5	—	70
Recruited January 1951	34	—	—	—	—	31	65
Failed School Certificate	—	2	—	—	—	—	2
Left to go to University College	—	—	3	—	2	—	5*
Resigned or Transferred	—	5	1	—	—	—	6
Failed Examinations	—	—	—	—	—	—	—
Invalided	—	—	—	—	1	—	1
Posted during year	—	—	19†	6	—	—	25
In School at 31-3-51	34	29†	—	—	2	31	96†

* Of these four are taking degrees courses in Agriculture or related science.

† Includes one student for Rural Education Department.

BUILDINGS AND EQUIPMENT

6. Building construction during the year has been limited to that necessary for the institution of the Field Overseer training and to a tractor garage. Quarters and classroom accommodation for thirty students have been erected and are in use.

THE SCHOOL FARM

7. The forty-acre School-farm has now been fully developed to provide excellent material for teaching all Agricultural subjects and cropping systems. About six and a quarter acres of the total area is taken up by students' quarters, livestock houses, farm stores, offices, machinery stores and roads, while of the remaining thirty-three and three-quarters acres about twenty-three acres are under a wide variety of arable crops grown under various systems of cropping including grass leys and erosion control systems. The remaining ten and three-quarters acres includes a permanent crop demonstration plot, a crop type collection, a fruit tree orchard and poultry run, a nursery and vegetable garden, a small fuel plantation, a permanent fodder plot and rotational grazing paddocks. The nursery and vegetable garden have been partly bench-terraced and partly laid down on a herringbone system of irrigation. The number of work cattle on the farm has been increased and the dairy has been fitted with clean milk production equipment including a sterilizing plant.

INVESTIGATIONS

8. The following useful information was obtained during the year from experiments conducted by students as part of their training.

(i) *Erosion Control*.—Preliminary observations were made on the amount of run-off water collected from seven small plots each having a different cover and all being on a slope of one in twenty-four. Amounts of soil removed were also measured. The following figures are of interest :—

Cover	Rate per acre Run-off (Surface)	Rate of dry soil removed per acre	Remarks	Rainfall lost as Run-off (Surface)
	gallons	lb		inches
1. Bare earth hand-weeded	168,659	13,089	—	7.4
2. Bare earth cultivated 5 inches deep ..	93,790	6,537	—	4.1
3. Yams, etc. on 3 ft contoured ridges ..	10,482	225	Intercrops Cotton and Cowpeas	0.5
4. Mucuna on flat after cultivating 5 inches deep.	2,110	86	Losses mainly in early part of year just after cultiva- tions	0.09
5. Guinea Grass on flat after cultivating 5 inches deep.	2,316	97	—	0.09
6. Yams, etc. on hills 3' x 3'	36,549	741	Intercrops Cotton and Cowpeas	1.6
7. Unweeded natural growth after cultiva- tion 5 inches.	408	4	Natural growth very dense. Largely Guinea grass	0.02

The superiority of a good cover on the soil for Erosion Control is clearly shown.

(ii) *Other Work*.—Experiments on pawpaw growing and papain production were continued. The reports on samples of papain sent to the United Kingdom for analysis were disappointing. It is considered unlikely that papain production in the Ibadan area would be financially successful.

Preliminary investigations were made into the possibility of ensiling sweet potato tubers and cassava roots, while two experiments one on maize and one on yams were carried out to investigate the amount of fertiliser to be applied on Ibadan soils.

B.—Samaru

COURSES

9. The school continued to train Agricultural Assistants on a three-year course, and Junior Native Administration Assistants on an eleven-month course.

In January 1951 a class of twenty-eight Middle VI boys mostly Southerners was started in order to fill vacancies for which Middle IV Northerners were unavailable. This Middle VI Class will have a modified course so that in effect three types of course are being given.

10. *Classes and Trainees*.—In April 1950 there were four classes and eighty-five trainees in the school and by the beginning of the 1951 school year this had risen to five classes and 124 trainees.

11. Of the 124 trainees, eighty-nine were for Government and thirty-five were for Native Administrations; thirty-five were Southerners and eighty-nine were Northerners; twenty-four had Middle II or Middle III, seventy-one had Middle IV or Middle V and twenty-nine had Middle VI or equivalent.

12. Difficulty is still being experienced in obtaining an adequate number of Northerners especially Hausas for the Agricultural Assistants Classes. It is gratifying to report that three Middle IV boys were recruited this year from Kano Middle School, three from Katsina Middle School, one from Zaria Middle School, but to offset this there were none from among Sokoto, Maiduguri, Yola, Bauchi, or Bida Middle Schools.

13. Samaru School has now reached its probable maximum capacity.

14. *Output.*—In 1932 the School produced three trained students. Between 1941 and 1946 an average of nine were produced each year. From 1947 to 1949 this rose to thirteen per annum, and in the current year to sixteen Agricultural Assistants (including two Native Administration trainees), and twenty-nine Junior Native Administration trainees.

THE SCHOOL FARMS

15. The School farms have been considerably enlarged and their teaching efficiency improved by the addition of workshops, stores, offices, etc. for training in the farm management and store and farm office routine. The total cultivated area of seventy-five acres is divided up as follows :—

36 acres	..	..	Three First Year Training Farms each of about twelve acres based on a Mixed Farmers Holding and each with stores, office, etc., for providing training in Departmental procedure.
3 acres	..	..	Second Year Crop Type Collection, Vegetables, Horticultural Work.
1 acre	..	..	Second Year Poultry Work.
14 acres	..	..	Third Year Tractor Farm where Assistants learn mechanical cultivation under the Principal Agricultural Engineer.
21 acres	..	..	For Third Year Individual Experiments with crops, grasses, silage, etc.
—			
75 acres			
==			

16. The School has sixty-two head of cattle, thirty-two goats and 149 poultry the last being used to demonstrate breeding methods in addition to poultry management. There are two incubators for poultry work.

17. With the gradual building up of school farms during post-war years it has been possible to implement the present policy of giving a much more practical type of training designed more to make Assistants familiar with the duties which they will eventually be called on to perform, than to give general knowledge of theory.

18. This change in the training policy has been greatly facilitated by the availability of cyclostyled notes which have been built up over a period of years at both schools and which enable more teaching to be done in the field and less in the classroom.

19. Trainees have carried out investigations on guinea-corn, groundnuts, cotton, proso, millet, citrus, and hay.

REPORT OF THE OIL PALM RESEARCH STATION

A.—Administration and Development

The development of the station has continued at an increased rate and considerable progress has been made with buildings and other capital works. As a result the demands of administrative affairs have taken up a considerable amount of time. On the research side, it is to be regretted that progress is still hindered to a considerable extent by the lack of specialist staff, although there was an improvement towards the end of the year.

2. *Finance*.—The Station is financed by a grant of £530,608 from the Nigerian Oil Palm Produce Marketing Board. This sum is expected to cover the Station's expenditure for the three-year period 1st April, 1949 to 31st March, 1952.

3. *Staff*.—There are now three substantive appointments to the staff of the Station and in addition two Temporary Research Officers have been recruited on agreement for three years. Two Botanists and a Senior Agricultural Officer of the Department of Agriculture were posted for duty to the Station and the Administration seconded two Development Officers. Two members of the Junior Service of the Department of Agriculture were also posted on trial for Senior Service appointments.

4. Allowing for the incidence of leave the average number of Senior Service staff on duty was nearly five. No less than eight specialist appointments of various types remained unfilled.

5. The established Junior Service staff totalled sixty-seven by the end of the year.

6. Under ordinary circumstances the total labour force employed, including out-stations, is over 1,200 men. There has been a very large fall in the numbers employed, in particular at the Main Station, where from an average monthly attendance of 649 men, it has fallen to 308. This has had an adverse effect on the general maintenance of the Station and on the planting programme of the coming year. The fall in the numbers of labourers employed is due to the rubber boom now being enjoyed by the rubber growers around Benin and to the higher rates of pay offered by them to labourers for work in the rubber plantations.

7. *Construction Programme*.—Further progress was made in the construction of the numerous buildings required, but the programme is still very much in arrears. The programme has been carried out by two resident Inspectors of works of the Public Works Department, with occasional supervision from the Provincial Engineer in Benin. All efforts to obtain an Engineer for the Station having failed so far.

Three houses for Senior Service Staff were completed during the year and two chalets for touring officers. A further three houses are under construction. This brings the total to seven houses completed and three under construction.

8. Good progress has been made with the building of houses in the model village of *Isiwuwa* for the Junior Service staff. At the end of the year two "A" type, five "B" type, thirty-four "C" type and 172 "D" type quarters had been completed and seventeen "C" type and four "D" type quarters were in various stages of construction.

9. The Pathology, Physiology and Chemistry laboratories have been completed but all lack electricity and gas, and in addition, the Chemistry and Pathology laboratories have no water. The offices for the Agronomist have been completed whilst those for the Plant Breeder are under construction. A gas plant has been installed and will shortly be in operation.

10. Some progress can be reported on the water supply; new pumps and engines have been installed and water is now pumped through a new six-inch main. Material has arrived for an elevated tank which has not yet been erected. No progress can be reported on the installation of an electricity supply.

11. *Planting*.—A further 170 acres of palms were planted during the year including a 100-acre Unit Plantation. This plantation was established as a result of the recommendations of the Technical Advisory Committee of the Oil Palm Research Station in 1948, in order to obtain information of the cost of establishing and running an oil palm

plantation on commercial lines. The planting of the plantation took place between the 25th May and 19th June, 1950, and has been most successful. A vacancy count taken on 17th March, 1951 showed that only thirty-four palms or 0.58 per cent require replanting in April 1951.

12. The total area now planted under oil palms is 905 acres. Planting continues to be very successful now that the "ball of earth" technique is used.

13. *Palm Fruit Yields at Oil Palm Research Station.*—The average yields of fruit bunches obtained at the Oil Palm Research Station from all areas planted at normal spacing are given in the following table. The yields are given in terms of age of plantation, the latter being reckoned from the time of planting out into the field, *e.g.*, an area planted in 1940 is reckoned to be ten years old during 1950.

YIELD OF PALMS ACCORDING TO AGE AT O.P.R.S. IN NUMBER OF BUNCHES AND WEIGHT IN LBS PER ACRE

<i>Age in Years of Plantation</i>	<i>Area in Acres</i>	<i>No. of Bunches per Acre</i>	<i>Weight in Lbs of Bunches per Acre</i>
4	38.8	334	910
5	193.3	356	1,976
6	193.3	412	4,065
7	182.0	420	5,565
8	173.9	360	6,289
9	142.7	322	6,567
10	44.2	364	8,006

14. *Sub-station : Ibesit, Abak.*—In August, it became possible for the Public Works Department to begin the building programme. By the end of the year, a Senior Service Rest House, two "C" type quarters and ten "D" type quarters for Junior Service staff were under construction. The programme is, however, a year behind schedule.

15. Recording of the natural palm groves was continued and the first planting, of just over seven acres, was done. This consisted of a trial of extension work seed, parallel to those laid down each year at the Main Station. A large nursery was made preparatory to a fairly large planting programme in 1951.

B.—Research

AGRONOMY DIVISION

16. The work of the Division has been hampered by the difficult staff situation. Of the three Agronomists on the establishment of the Station, two of the posts still remain unfilled. The only Agronomist was on vacation leave from May to November 1950, and on his return from leave he was posted to the Administrative office to help with general administration. An Agricultural Superintendent (on trial) of the Department of Agriculture, on secondment to the Station, was posted to the Division in September, 1950.

17. The work of the Division has been seriously affected by the general shortage of labour on the Station and maintenance of nurseries and planted areas was very poor throughout the latter half of the period. Preparation of the 1951 nurseries is very far behind schedule and the 1951 planting programme will probably have to be reduced to the bare minimum.

18. *Establishment of Palms*.—Average germination of all seed sown in July 1949 was 76 per cent after nine months, compared with 72 per cent for a similar period for seed sown in July 1948. Owing to more rapid germination being obtained from the new water-heated germinator, seed was sown one month later than usual in 1950, in August. Germination has not been quite as good as in earlier years, the figures after seven months being only 66 per cent average germination, comparative figures for 1949 and 1948 being 72 per cent and 70 per cent respectively.

19. Owing to the poor state of the pumping system, water was in short supply and it was not possible to water the seedlings in the nurseries during the dry season. Luckily there were slight falls of rain in January, February and early March, normally months without rain, and this undoubtedly helped the seedlings. Total losses up to the end of February 1951 were only 12 per cent, the same figure as for 1950, but the lack of water is reflected in the number of seedlings "doubtful", *i.e.*, not likely to survive, which were (February, 1951) 18 per cent as compared with 1 per cent at the same time in 1950.

20. A summary of seed sown in the germinators and seedlings planted in the nursery in 1950 is given below :—

	Seed sown 1950	Seedlings planted 1950 (sown 1949)
(i) Standard Dura Palm	4,002	1,285
(ii) Seed for Agricultural Experiments	41,304	11,891
(iii) Extension Work Seed	7,188	2,287
(iv) Breeding Programme Seed	99,916	—
(v) Miscellaneous	42,661	10,955
Total	195,071	26,418

21. *Experimental Work at O.P.R.S.*—Agronomic Experiments already in progress were continued and the following new experiments started :—

- (i) *A Nursery Experiment* to test various techniques, to repeat that laid down in 1949 and to check the results from the 1948 and 1949 experiments.
- (ii) *A Seedling Selection Experiment* to test whether selection of seedlings for vigour at both the raised tray and nursery stages is of later benefit.
- (iii) *A Transplanting Experiment* to test the relative efficiency of the "ball-of-earth" planting technique at various planting dates throughout the wet season.
- (iv) *Two Fertiliser Experiments* testing factorial combinations of nitrogen, potash, phosphate, magnesium, lime and organic manures. The two experiments were laid down in 1950 on palms planted in 1948 and 1949 respectively.
- (v) *A Burning-holing-planting Experiment* (19.2 acres) to test factorial combinations of various methods of opening up a palm plantation and the planting of the palms in it.
- (vi) *A Time of Harvesting Experiment* (30.4 acres) to find out the optimal time after planting to start harvesting a palm plantation.

22. *Farmers' Plots.*—Owing to shortage of supervisory staff, the 1950 dressings of fertilisers could not be applied to those experiments laid down in 1949 which call for annual applications. It is hoped to make these applications in 1951 and that the experiments will not be seriously upset. No extension of the programme of experiments was possible.

23. *Germination of the Oil Palm.*—With the arrival of a Temporary Research Officer in August 1950 it was possible to begin research connected with the germination of the seeds of the oil palm. In the past quite unpredictable results have been given which, in the case of specially produced seeds for a breeding programme, is most undesirable. Attempts are therefore being made to elucidate the two major variables.

- (i) The difference in the speed of germination shown by seeds from the same bunch.
- (ii) The difference in the total germination shown by the seeds from different bunches.

24. A review is being made of the past experiments on the germination of the seed of the oil palm and the following new experiments have been laid down.

1. To test the viability of seed from parent trees of different ages, to find whether age affects the viability or if it is peculiar to that tree.
2. To find the optimum method of seed preparation.
3. To investigate the loss in viability in seeds due to storage.
4. To find whether the use of any particular wood for germinator trays inhibits the germination of the seeds.

25. Research on the optimum temperature requirements for germination have had to be postponed but it is anticipated this will begin in the near future.

PLANT BREEDING DIVISION

26. *Breeding Programme.*—The 1949-50 breeding programme has reached the final stage, a few crosses, the seeds from which have given a poor germination, will have to be repeated. A total of 174 crosses have been made all under the supervision of Senior Service Officers.

27. *Introductions and Seed Exchanges.*—Many introductions of palm seeds have been received from other countries and considerable interest is attached to the introduction of *Elaeis melanococca*. A total of 988,700 seeds were sent to various countries as shown in the table below :

					<i>Artificially polli- nated Seed</i>	<i>Open pollinated Seed</i>
Liberia	..	..	..	..	30,000	800,000
Northern Rhodesia	..	..	..	..	3,000	—
Peru	..	..	..	..	1,500	—
Sierra Leone	..	..	..	..	50,000	—
Guatemala	..	..	..	..	1,000	—
Cuba	..	..	..	..	—	100
Malaya	..	..	..	..	800	100
Trinidad	..	..	..	..	1,300	—
Ecuador	..	..	..	..	900	—
Sudan	..	..	..	..	—	100,000
Total	..	..	..	..	<u>88,500</u>	<u>900,200</u>

28. *Planting*.—An experiment covering 18.8 acres was planted to test the *dura* x *tenera* and *tenera* x *dura* crosses from Ogba and a further six acres was planted with various introduced types of *Elaeis guineensis*.

29. *Palmetum*.—This area was planted in 1950 with 170 palms of species other than *Elaeis guineensis*. It is the first planting of what is hoped will be a comprehensive collection of palms which may prove of use in breeding and cytological studies. The palms were adversely affected by the dry season and had to be shaded and watered from December onwards.

Many of the palms, especially the coconut collection, have failed and will require supplying in the coming year.

30. *Improved seed for farmers*.—Almost one million seeds were produced this year, details of which are given in the following table:—

Cross	Ogba	Nkwelle	Umuahia	Ibadan	Other Stations	Total
Dura x dura	308,820	53,188	29,820	12,868	1,093	405,789
Dura x tenera	—	29,484	22,050	—	—	51,534
Tenera x dura	219,548	—	—	5,006	—	224,554
Dura x pisifera	213,937	37,956	18,278	8,640	2,976	281,787
	742,305	120,628	70,148	26,514	4,069	963,664

31. A start has been made with the revision of selected palms at Umuahia and Nkwelle.

PLANT PATHOLOGY DIVISION

32. The work of the division suffered an unfortunate check due to the absence of a Pathologist on the Station during the period May to December 1950, when no pathological work was possible.

33. On the arrival of a newly appointed officer in January 1951, work was resumed on the nursery root disease of oil palm seedlings and in writing up a summary of all previous nursery experiments. Several fungi have been isolated from the diseased seedlings but the causal organism, if any, of the root disease has not yet been established. A field experiment to test the effect of various trace elements on the nursery disease has given some indication that copper is helpful in reducing losses.

APPENDIX I

SUMMARY OF EXPENDITURE AND REVENUE FOR PERIOD 1ST APRIL, 1950 TO 31ST MARCH, 1951

EXPENDITURE

Service	Personal Emoluments £	Other Charges £	Special or Capital Expenditure £	Total £
Main Agriculture	139,377	206,578	56,589	402,544
Agricultural Development	81,677	83,445	26,635	191,757
Oil Palm Research Station	14,186	38,848	85,126	138,160
Cocoa Scheme	41,582	31,316	25,703	98,601
Production Scheme	—	32,402	—	32,402
Total	£ 276,822	392,589	194,053	863,464

REVENUE

	£
Sale of Agricultural Products	23,405
Production Schemes	53,648
Development Schemes	183
Oil Palm Research Station	1,255
	<u>£78,491</u>

APPENDIX II

FINANCIAL STATEMENT—1ST APRIL, 1950 TO 31ST MARCH, 1951

EXPENDITURE

Service	Personal Emoluments £	Other Charges £	Special or Capital Expenditure £	Total £
1. MAIN AGRICULTURE :				
Nigerian	52,768	39,746	5,653	98,167
Northern	44,950	84,759	32,908	162,617
Western	24,260	41,119	9,286	74,665
Eastern	17,399	40,954	8,742	67,095
Total, Main Agriculture .. £	139,377	206,578	56,589	402,544
2. AGRICULTURAL DEVELOPMENT :				
(a) <i>Development and Welfare :</i>				
Nigerian	3,606	217	7	3,830
Northern	11,415	2,920	—	14,335
Western	4,586	1,188	1,450	7,224
Eastern	2,689	1,024	735	4,448
Total (a) £	22,296	5,349	2,192	29,837
(b) <i>Colonial Development and Welfare Schemes.</i>				
Nigerian	20,304	3,382	—	23,686
Northern	10,966	33,029	3,027	47,022
Western	10,073	17,621	10,922	38,618
Eastern	9,700	11,948	8,631	30,279
Total (b) £	51,043	65,980	22,580	139,605
(c) <i>Agriculture, Engineering Branch :</i>				
Nigerian	856	222	—	1,078
Northern	5,157	9,861	1,175	16,193
Western	1,136	1,361	688	3,185
Eastern	1,187	672	—	1,859
Total (c) £	8,336	12,116	1,863	22,315
Total (a) (b) and (c) .. £	81,677	83,445	26,635	191,757

FINANCIAL STATEMENT—1ST APRIL, 1950 TO 31ST MARCH, 1951

EXPENDITURE—continued

Service	Personal Emoluments £	Other Charges £	Special or Capital Expenditure £	Total £
3. RESEARCH SCHEME : Oil Palm Research Station	14,186	38,848	85,126	138,160
4. COCOA DIVISION : Agricultural Department				
(a) Headquarters and Administration ..	3,365	234	2,232	5,831
(b) Nigeria Cocoa Survey :				
Western	18,716	10,213	10,354	39,283
Eastern	2,316	1,244	4,038	7,598
Total (b) £	21,032	11,457	14,392	46,881
(c) Cocoa Soil Survey :				
Western	875	350	7,080	8,305
(d) Long Term Rehabilitation :				
Western	—	10,377	—	10,377
Eastern	—	388	—	388
Total (d) £	—	10,765	—	10,765
(e) Improvement in quality of Cocoa :				
Western	—	1,542	—	1,542
Eastern	—	358	2	360
Total (e) £	—	1,900	2	1,902
(f) Swollen Shoot Emergency Measures :				
Western	16,310	6,610	1,997	24,917
Total (a) to (f) £	41,582	31,316	25,703	98,601
5. PRODUCTION SCHEMES :				
Pig Production	—	27,815	—	27,815
Kano Dairy	—	1,400	—	1,400
Badeggi Rice Mill	—	3,187	—	3,187
Total £	—	32,402	—	32,402

REVENUE

	Revised Total	Sub-head Total
£	£	
1. Sale of Agricultural Products :—		
Nigerian	4,707	
Northern	4,963	
Western	5,231	
Eastern	8,504	23,405
2. Production Schemes :—		
Pig Production	37,487	
Kano Dairy	1,183	
Badeggi Rice Mill	14,978	53,648
3. Development Schemes :—		
Western	175	
Eastern	8	183
4. Oil Palm Research	1,255	1,255

APPENDIX III

SENIOR SERVICE STAFF AGRICULTURAL DEPARTMENT AS AT 31st MARCH, 1951

<i>Substantive Post</i>	<i>Name</i>	<i>Substantive Post</i>	<i>Name</i>
Director of Agriculture	A. G. Beattie	Agricultural Superintendents —continued	M. A. Osho O. E. Ikpi A. E. L. Thorpe R. B. A. Max-Lino D. P. Franklin R. A. Hind P. J. Brewer J. M. Garba J. Ricketts S. M. Chapple
Deputy Director of Agriculture (H.Q.)	J. D. Brown		J. M. Roberts W. M. Phillips J. L. Cooper D. J. McKinlay A. B. S. Ransford G. B. Emslie C. A. Kershaw G. G. Barstow I. G. Mathers R. N. Champion-Jones J. C. Simmonds R. D. May T. M. Greensill Lt.-Col. D. J. Iddon J. Sommerville G. A. Longhorn W. Braback W. C. Evelyn J. M. L. Kowal P. Halsall H. M. Epton D. L. Garrick T. V. Beer
Deputy Directors of Agriculture (Regional)	J. W. Wallace M. Park R. Johns, O.B.E. D. H. Brown	Agricultural Development Officers	Dr H. Vine H. Irving A. M. Durning (Miss) M. Greenwood, O.B.E. J. R. G. Sutherland J. T. Davey W. E. Freeman T. A. Russell Dr J. M. Waterston J. H. Gisborne A. R. Maurer A. J. Vernon A. B. Emmerich
Assistant Director of Agriculture	A. V. Gibberd, M.B.E.		W. Matthewson R. M. Davis A. R. Jesty A. A. Smyth, O.B.E. D. J. Noble S. J. Marriott N. Slater J. Neilson R. V. Watts E. Davies
Principal Agricultural Officers	M. W. Gibbon A. F. W. Sheffield		A. J. Evans
Principals of Schools	D. H. Welch T. A. Phillips		
Senior Agricultural Officers	E. T. Holmes E. W. Momber J. F. Ward V. F. Olivier J. M. S. Usher-Wilson J. D. Tallantire R. F. A. L. Reed W. F. Gwilliam E. J. Butler T. N. Greeves F. J. Harper P. A. Gething J. W. D. Goodban A. H. S. Vigo, M.B.E. T. E. Ryall	Senior Chemist Chemists	
Agricultural Officers	V. E. Gale H. J. Taylor R. B. Warner L. D. G. Cromwell F. G. Bridges W. J. C. Little G. C. Gamey A. G. Cullum A. N. C. Thomas D. J. O. Bourke A. A. Kingshotte A. I. Taylor D. G. M. Hutchison D. McL. Grieve S. S. Parker R. E. Rowe	Senior Entomologist Entomologist Senior Botanist Botanists	
	P. Mulholland R. Miller J. O. I. Longe R. F. S. Hainsworth J. A. Carter J. A. Makinde T. S. B. Aribisala D. R. E. Jackson T. Geddie J. N. W. Niccolls M. Lawan S. Z. Moczarski B. U. A. Attah L. Lotringer G. E. Okiy S. A. Omenai	Principal Agricultural Engineer Agricultural Engineers Irrigation Engineers Mechanic Demonstrators Mines Land Reclamation Officer	

SENIOR SERVICE STAFF AGRICULTURAL DEPARTMENT AS AT 31st MARCH, 1951

<i>Substantive Post</i>	<i>Name</i>	<i>Substantive Post</i>	<i>Name</i>
Specialist Officers	J. Kitching C. A. Thorold J. L. Gregory	Temporary Research Officers	R. W. C. Galt J. D. Allen
Accountant	S. A. Oloko, M.B.E.	Cocoa Survey Officer-in-Charge	J. R. G. Hadland
Administrative Assistants	K. Husk	Cocoa Survey Officers	H. T. C. Chipp J. E. Clayphon C. A. Parkinson J. A. Ayorinde H. W. Reeves A. K. Campsie R. G. Thomas
Grade II	S. A. Priddy, M.B.E. A. E. Deslandes (Miss)		
Cotton Cultivation Officers	C. C. Fuller R. G. Gilbert G. L. Finning A. B. Alexander F. G. Nelson F. A. Tyler	Temporary Cocoa Survey Officers	J. C. Brown J. Lewis L. N. Fumasoli J. Conrad A. L. E. Pugh T. H. R. Hall A. R. Dunlop W. G. D. Walters
OIL PALM RESEARCH STATION			
Officer-in-Charge	F. W. Toovey		
Agronomist ..	A. C. Trueblood		
Geneticist ..	A. F. M. Broekmans	Soil Scientist	

ORGANISATION OF DEPARTMENT OF AGRICULTURE:
FOR PERIOD ENDING MARCH, 1951.

DIRECTOR OF AGRICULTURE

DEPUTY DIRECTOR OF AGRICULTURE (HEADQUARTERS).

PRINCIPAL AGRIC. OFFICER. SECRETARY.	ACCOUNTANT.	ADMINISTRATIVE ASSISTANT.
--------------------------------------	-------------	---------------------------

P. D. OF A.
N. P.
A. D. A. N. P.

D. D. OF A.
W. P.
A. D. A. W. P.
(W. P. and COLONY)

D. D. OF A.
E. P.
A. D. A. E. P.

ALL PROVINCIAL AGRICULTURAL OFFICERS,
 SUPERINTENDENTS AND AGRIC. DEVELOPMENT
 OFFICERS ASSISTED BY IRRIGATION ENGINEERS,
 AGRICULTURAL ENGINEERS AND OFFICERS
 OF THE OTHER SPECIALIST SECTIONS.

ASSISTANT DIRECTOR
(EXPERIMENTS)
 AGRICULTURAL CHEMISTS
 BOTANISTS
 ENTOMOLOGISTS

O. P. R. S.
OFFICER-IN-CHARGE

PRINCIPAL EXECU -
 TIVE OFFICER

PRINCIPAL RE -
 SEARCH OFFICER
 SPECIALIST AND
 AGRONOMIC STAFF

PRINCIPAL AGRIC.
ENGINEER
 AGRIC. ENGINEER
 AND MECHANIC
 DEMONSTRATORS
 IN EACH REGION.

PRINCIPALS OF
 AGRIC. SCHOOLS (2)
 AT
 ZARIA & IBADAN
 NEW SCHOOL
 PROJECTED IN
 DEVELOPMENT
 PLAN FOR E. P.

COCOA EMERGENCY SCHEME (RESPONSIBLE TO

C. C. W. P. IN
CONSULTATION
WITH D. OF A.)

D. D. A. (COCOA).
 A. D. A. (COCOA).
 AND COCOA
 SURVEY TEAM.

